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THE
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AND OF THE
INSTITUTIONS IN UNION.

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No. 470.

FRIDAY, NOVEMBER 22, 1861.

VOL. X.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 22, 1861.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £438,800, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

In considering the probability of the building being ready by the stipulated time, the only part of the work which at all occasions anxiety is the domes. A very great portion of the rest of the building depends for its completion on that of the domes; the scaffolding used for their erection must be taken down before the work in the vicinity can be proceeded with, and its removal will occupy some time. It seems to be imperative that both domes should be finished early in January. The Thames Iron Company, who have taken the sub-contract as well for the supply of the iron as for the erection, seem to be not quite sufficiently impressed with the urgency of the case. Doubtless, when they take into consideration the magnitude and importance of the undertaking, and the serious manner in which delay is likely to affect the national character for promptitude and punctuality, they will use every exertion to accomplish the task according to their engagement. At the same time it is satisfactory to learn that the contractors, alarmed at the probable consequences of failure in this respect, have themselves commenced the erection of the western dome, and the progress already made contrasts very favourably with the corresponding work at the other end of the nave.

Meanwhile the other portions of the building which are not dependent for their advancement on the erection of the domes, are being pushed

forward with a rapidity which leaves nothing to be desired. The fifty feet girders and ridge-roof have been fixed over the whole of the south-eastern court, and are carried on over the intervening gallery into the south central court. The same operation has commenced in the courts on the northern side of the nave.

The Picture Galleries along the Cromwell-road front are in a very forward condition, that on the east being floored, and its walls boarded throughout. The towers at the eastern end are having their top lights fixed, and the roofing of the corresponding ones at the other extremity is nearly completed; the roof also over the central entrance, which will here form an attic story, has been begun.

The success of the British portion of the Exhibition, and the favourable influence which it is to be hoped it will exercise on our commerce and manufactures, depend now to a great extent on the manner in which the different committees sub-allot the space placed at their disposal. As there is great reason to suppose that continental nations are making earnest efforts to rival or even outvie us in our staple manufactures (especially machinery and metal work), it is of the utmost importance that committees should bear in mind the necessity of making such a show in their respective classes as shall adequately represent, not only the progress of the last ten years, but also the superiority of those manufactures in which we particularly claim the pre-eminence over foreign productions.

It is, perhaps, to be regretted that some of the Committees, especially those which are national and represent the whole country, consisting rather of scientific men than of exhibitors, or persons practically interested in the commercial result of the Exhibition, seem to be inclined to look more to the educational element, and to make such a selection as shall display, in a graduated series, a popular and instructive idea of our manufactures. Of course the adoption of such a course rests ultimately with exhibitors themselves, and, if it can be made to combine the more practical view, would be no doubt of great advantage; but it seems hardly wise that such a proceeding should be pushed to any length to the detriment of the benefits which our manufacturers and tradespeople hope to derive from the Exhibition.

It is to be hoped, therefore, that committees will deal with applications for space in the spirit

of the following extracts from the circular addressed to Local and Metropolitan Committees:

"I am directed by Her Majesty's Commissioners to transmit to you the accompanying printed applications for space which have been made by proposed exhibitors, and to request that your Committee will forthwith proceed to investigate them, with the view to such a treatment of the demands as shall do credit to the present state of National and Local Industry, and bring them within the total amount of floor space assigned to your Committee."

"The Commissioners desire to observe that the mere application for space confers no right whatever on the claimant to be admitted at all, or to have any particular amount assigned to him. The Committee have the power of rejecting applications altogether which seem to them to be worthless, and considerably reducing any claims, as they may think fit. The Committee will, therefore, be under no rule as to the division of the space allotted to them, and it is not necessary to allot to each exhibitor in proportion to his demand."

The following additional arrangements have been made:—

SPAIN.

The following gentlemen have been appointed Commissioners in Spain for selecting and forwarding the various articles intended to be exhibited in the Spanish Department of the coming Exhibition:—His Excellency the Duke of Veragua, *President*. Their Excellencies the Marquis de Perceles, and Don Alesandro Oliván, *Vice Presidents*. Their Excellencies Don Francisco de Luxan, Don Pascual Madoz, Don Jose Caveda, Don Augusto Ulloa, Don Jose de Ybarra, Don Isidoro Dias de Arguelles, Don Augustin Pascual, Don Rafael Amar de la Torre, Don Antonio Arriete, Don Fernando Bocherini, Don Valentin Carderera, Don Jose Piquez, Don Trutos Saavedra y Meneses, and Don Jose Godoy Alcantara, *Secretary*.

FIRST ORDINARY MEETING.

WEDNESDAY, NOVEMBER 20TH, 1861.

The First Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 20th inst., Sir Thomas Phillips, F.G.S., Chairman of the Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Adams, Thomas.....	Lenton Firs, near Nottingham.
Adcock, Wm. Thompson.	Worcester.
Ainslie, Wm. George ...	Ford House, Ulverston.
Alcock, Henry	36, Stockwell-park-road, S.
Atkin, Harry Wright ...	{ 39, Ely-place, Holborn, E.C., and Truro Works, Sheffield.
Austin, George	7, London-street, E.C.
Baily, John Walker	71, Gracechurch-street, E.C.
Baker, William	Euston Station, N.W.
Banbury, Frederick	46, Westbourne-park-road, W.
Barnes, John Hickman ...	6, Fitzroy-square, W.
Barrett, Henry	Beech-street, Barbican, E.C.
Barrow, Wm. Hodgson, } M.P.	Nottingham.
Bass, Michael Arthur ...	Burton-upon-Trent.
Batters, George	{ 8, Elm-grove, Peckham-rye, S.E.
Bazalgette, John Van Nor-	{ 1, Delahay-street, Westmin-
den	ster, S.W.
Beale, Willert.....	28, Grosvenor-street, W.
Beisly, Sidney	{ The Cedars, Laurie-park, Sydenham, S.E.
Bellamy, Alan Charles } Bruce	10, Cornhill, E.C., and Streat-
	ham, S.

Belt, Thomas.....	{ Ryton, near Newcastle-on-
	Tyne.
Bennett, John	{ 50, Westbourne-park-villas, Bayswater, W.
Bentall, Edwd. Hammond	{ Heybridge, near Maldon, Es-
	sex.
Benyon, Richard	{ 34, Grosvenor-square, W., and
	Englefield House, Reading.
Berners, Lord	{ Keythorpe Hall, Leicester.
Birkbeck, George H.	{ 34, Southampton-buildings, W.C.
Birkin, Richard	{ Appley-Hall, near Notting-
	ham.
Birly, Richard.....	{ Seedley, Pendleton, Manches-
	ter.
Bischoff, James	{ 72A, Old Broad-street, E.C.
Black, Henry, jun.....	{ 1A, Berners-street, W.
Bone, Geo.	{ 44, Minories, E.C.
Boord, Joseph.....	{ 14, Upper Hyde-park-gardens, W.
Boord, Thos. Wm.	{ 7, Greville-road, Kilburn, N.W.
Booth, Edwin.....	{ Barnsley.
Boreham, Wm. Wakeling, F.R.A.S.	{ Haverhill, Newmarket.
Bradley, John.....	{ The Park, Nottingham.
Brakell, Thos.....	{ Cook-street, Liverpool.
Brefit, Edgar	{ 61, King William-street, E.C.
Brogden, John	{ 4, Highbury-park North, N.
Brooke, Thos.....	{ Northgate Mount, Hudders-
	field.
Brown, M. L.....	{ 47, St. Martin's-lane, W.C.
Brownfield, Wm.	{ Chatterly-house, Hanley, Staffordshire.
Browning, Thomas.....	{ 6, Whitehall, S.W.
Brunswick, Myrthil	{ 26, Newman-street, Oxford-
	street, W.
Burt, Stephen John	{ 26, Farringdon-street, E.C.
Candy, Charles	{ 4, 5, and 6, Watling-st., E.C.
	and Wellfield, Streatham.
Carstairs, Peter	{ The Green, Richmond, S.W.
Carter, Edwin Jones	{ 3, Watling-street, E.C., and
	Upper Homerton, N.E.
Chaplin, R. J.	{ 17, Red-cross-square, E.C.
Chapman, Wm.....	{ Nottingham.
Chappell, Thomas	{ 50, New Bond-street, W.
Chatteris, Henry	{ The Grove, Lee, Kent
Chatto, John	{ Royal College of Surgeons, W.C.
Clark, Hy., M.D.,	{ Southampton.
Clarke, Robert	{ London Coffee House, Lud-
	gate hill, E.C.
Clay, Richard	{ Bread-street-hill, E.C.
Clennell, John Edward...	{ London-fields, Hackney, N.E.
Clifford, Charles.....	{ 5, Hare-court, Temple, E.C.
Cobden, George Long ...	{ 13, Leonard-place, Kensing-
	ton, W.
Collard, Charles L.	{ Oval-road, Regent's-park, N.W.
Cooper, George Binion ..	{ 121, Drury-lane, W.C.
Cooper, Henry.....	{ 20, Moor-street, Soho, W.
Copeland, Alfred J.	{ Manor-house, Bushy, and
	160, New Bond-street, W.
Cossham, Handel	{ Shortwood-lodge, near Bristol
Couchman, Henry	{ Elm-cottage, Lee-road, S.E.
Cowtan, Maiver.....	{ 23, Sheffield-terrace, Camp-
	den-hill, W.
Collett, Charles	{ 90, Cannon-street, E.C.
Cory, William, junr.....	{ 4, Gordon-place, W.C., and
	Coal Exchange, E.C.
Cox, Wm. Thos.	{ Spondon Hall, near Derby.
Crawley, Charles Edward	{ 17, Gracechurch-street, E.C.
Cullingford, W. H.	{ 7, Phillimore-gardens, Ken-
	sington, W.
Curtis, Thomas	{ The Hall, Berkhamstead.
Darton, J. M.....	{ 58, Holborn-hill, E.C.

Davidson, Adam.....	{ The British Linen Company Bank, Nairn.	Halloran, Arthur B., F.R.G.S.....	9, Regent-park, Heavitree, Exeter.
Davies, Henry	21, Duncan-ter., Islington, N.	Hankey, Blake Alex. ...	38, Portland-place, W.
Davy, Charles.....	{ Gwynne House, Woodford Bridge, and 100, Upper Thames-street, E.C.	Harrison, Thos., jun., B.A.	{ 17, Clarendon-road, Kensington, W.
Dawson, John.....	{ New Park-road, Clapham-park, S.	Harris, James	Hanwell, W.
Day, C. A.	{ Northam Iron Works, Southampton.	Harpley, Matthew John ..	Royal Regt., of Horse Guards, Stapleford.
Deed, Martin	451, Oxford-street, W.C.	Headley, Richard	{ 12, Ovington-terrace, Brompton, S.W.
Dennett, Chas. Cotton ...	Nottingham.	Hely, Francis Edward ...	1, London-street, E.C.
Denton, Chas. Jones	{ 5, Clarendon-terrace, Bow-road, E.	Hemming, Fred. Shand...	Belsize-pk., Hampstead, N.W.
Dewsnap, W.	{ 7, and 57, St. John's-square, E.C.	Hennet, Pollett Charles...	Bridgewater.
Dixon, James	22, Tavistock-square, W.C.	Herbert, Wm. (Messrs. Symes and Co.).....	{ 33, Fenchurch-st., E.C., and Rectory Grove, Clapham, S.
Dodson, Henry	{ Cambridge Lodge, Penge-rd., Sydenham, S.E., and 98, Blackman-st., Borough, S.	Hester, John Cooks	{ 14, Little Tower-street, E.C.
Donald, Thos. W.....	69, Regent-street, W.	Hewett, Henry John ..	{ 19, Alexander-square, Brompton, S.W.
Dowell, Wm.....	{ 14, Bexley-place, Greenwich, S.E.	Hill, James Duke	25, Coal Exchange, E.C.
Dowie, James.....	455, Strand, W.C.	Hill, Thomas Rowley ...	Catherine-hill House, Worcester.
Driver, Henry	Windsor.	Hindley, Chas. Hugh ...	134, Oxford-street, W.
Duncan, James	Greenock.	Hinstin, Ernest	22, Milk-st., Cheapside, E.C.
Dunsford, Wm. James ...	{ 14, Taviton-street, Gordon-square, W.C.	Hitchcock, Frs. Maunder.	Southmolton, Devon.
Durlacher, Alex.	15, Old Burlington-street, W.	Hodge, Charles	Oak-lane, Limehouse, E.
Eborall, Cornelius Willes.	2, Lee-park, Blackheath, S.E.	Hunt, Richard	Scarborough, Yorks.
Espin, John	Davies-st., Berkeley-sq., W.	Hutchinson, John Henry.	{ 19, Little Pulteney-street, W.
Evans, E. Bickerton	Worcester.	Hutchinson, John	{ Appleton Lodge, Warrington, Lancashire.
Evans, Robert Harding ...	{ 73, Warwick-square, Belgravia South, S.W.	Hunting, Richard	139, Regent-street, W.
Faiden, Richard	{ 5, Queen's-row, Turnham-green, W.	Hyde, Edmund	Kingston-on-Thames, S.W.
Farncombe, Chas.	{ 19, Culford-road, North Kingsland, N.E.	Ingram, Alexander	Stranraer, Wigtownshire.
Farrow, Chas.	{ 18, Great Tower-street, E.C., and Holly-lodge, Wood-street, Walthamstow, N.E.	Ingle, Henry	102, Shoe-lane, E.C.
Feversham, Lord	1, Great Cumberland-st., W.	Jackson, Edward	Rochford Bank, Rochford.
Filmer, Thos. H.	28, Berners-street, W.	Jacob, Edward	4, City-road, E.C.
Finnis, Thos. Q., (Alderman)	79, Great Tower-street, E.C.	Jarvis, John Stephen.....	{ 47, Tufnell-park-road, Hol-loway, N.
Firmin, Geo. J.	{ Atlas Chemical Works, Boro'-road, S.E.	Jellicoe, Charles	{ 23, Chester-terrace, Regent's-park, N.W.
Fischer, John Phillip ...	{ Tower-street, E.C., and Pebble Combe, Epsom.	Jenkins, Chas. Fredk. ...	{ 9, Sunderland-terrace, Westbourne-park, W.
Fisher, Joseph Chas.	{ 3, Cripplegate-buildings, Wood-street, E.C.	Joel, Joseph	Brompton-hall, S.W.
Fisher, James.....	{ Radford Works, near Nottingham.	Johnson, Charles	{ 10, Addison-road, Kensington, W.
Forster, Geo. Baker	Newcastle-upon-Tyne.	Jonas, Samuel Adolph ...	{ 2, Bow-lane, E.C.
Foster, Sampson Lloyd ..	The Five Ways, Walsall.	Jones, Edward	{ The Larches, Handsworth, Birmingham.
Franklyn, George Wood- roffe, M.P.	Lovell-hill, Windsor.	Jones, Frederick John ...	{ 10, Aldermanbury, E.C.
Fuller, Wm. Moxon	{ Grimstone-cottage, Wolverhampton.	Joske, Paul	Baron House, Mitcham, S.
Fulton, J. Rennie	34, Duke-st., St. James, S.W.	Kennedy, Chas. Burton...	Fairview, Ulverston.
Gerstenberg, Isidor	11, Warrford-court, E.C.	Kennedy, Myles	{ Burton-cottage, near Ulverston.
Glass, Thomas	{ 24, Somerset-street, Kingsdown, Bristol.	Kershaw, Joseph Goodwin.	Mordon-rd., Blackheath, S.E.
Goode, Thomas.....	19, South Audley-street, W.	Kirk, Alfred	Horncastle.
Goodwyn, Major-Gen. H.	{ 4, Blomfield-terr., Harrow-road, W.	Kyle, John Joseph J.....	Bogle-street, Greenock.
Graham, Alexander	{ South-fields, Wandsworth, S.W.	Lascelles, Francis	{ Oakhill-park, Hampstead, N.W.
Graham, William	Manchester.	Leeks, Mrs. E. F.	73, Warwick-square, S.W.
Grant, George	59, Oxford-street, W.	Lelean, William	{ 21, Queen's-road West, Regent's-park, N.W.
Grew, Frederick	8, Leighton-vils. Holloway, N.	Lennox, Lord Henry Gordon, M.P.....	51, Portland-place, W.
Gunter, Richard.....	East Hill, Wandsworth, S.W.	Lethbridge, J. C.	25, Abingdon-street, S.W.
Guy, George	{ 6, Powis-pl., Haverstock-hill, N.W.	Lewenz, Ivan	{ 23, Fenchurch-street, E.C.
Hallett, George.....	52, Broad-wall, Blackfriars, S.	Lewis, John	{ 46, Guildford-street, Russell-square, W.C.
Halliday, Richard	5, Sergeant's Inn, Temple, E.C.	Loam, Matthew	Liskeard, Cornwall.
		Loam, Michael, jun.	Liskeard, Cornwall.
		Lock, Sam. Robt.	{ 9, Bernard-st., Primrose-hill, N.W.
		Lucas, Alfred	Luton Bank, Luton.
		Lucas, James J. H.	{ 13A, Upper Woburn-place, Tavistock-square, W.C.
		Maclaren, George	{ 5, Cursitor-street, Chancery-lane, E.C.
		McCorquodale, George ...	Newton, near Warrington.

M'CLean, Frank	{ 2, Park-street, Westminster, S.W.	Richardson, T. Shepherd { Clapham-house, Litlington, Sussex.	
M'Clure, William	Manchester.	Richards, Wm. { 16, River-street, Myddleton-square, E.C. .	
McKewan, William	21, Lombard-street, E.C.	Rider, Samuel C. { 3, Albion-villas, Tollington-park, Hornsey-road, N.	
Marshall, James	{ 11, Vere-street, Oxford-street, W.	Ringland, William { 36, Wood-st., Cheapside, E.C.	
Marston, Henry	94, Albany-street, Regent's-park, N.W.	Roberts, Daniel	{ 16, Northampton-place, Old Kent-road, S.E.
Martin, Geo. W.	14 and 15, Exeter Hall, W.C.	Roberts, Henry	{ 32, Arlington-street, New North-road, N.
Martin, Peter, J. P.	The Street, Rivington Chorley, Lancashire.	Robinson, J. H.	The Grove, Petworth, Sussex.
Masset, Alfred Moyse ...	13, Sanford-place, Stoke Newington, N.	Roe, George	Nutley, Dublin.
Masson, Francis John ...	53, Bolsover-street, W.	Rogerson, John	{ Newcastle-on-Tyne, 2, Royal Exchange-buildings, E.C., and Killingworth-house, Northumberland.
May, Geo. B.	Truro.	Rolls, R. H.	Banbury.
Mayhew, Chas. Fredk. ...	{ 10, Barge Yard - chambers, Bucklersbury, E.C.	Rowland, Alexander W.	20, Hatton-garden.
Melles, William	11, Alwyne-road, Canonbury, N.	Rubens, Victor	{ 1, Angel-court, Throgmorton-street, E.C.
Metzler, G. T.	{ 35, 37, and 38, Great Marlboro'-street, W.	Rumbold, William Henry	The Grange, Tunbridge Wells.
Meyerstein, Wm.	9, Highbury-grove, N.	Ryan, James, J. junr.	116, Long-acre, W.C.
Miller, Geo. James	{ 6, Great College-street, Westminster, S.W.	Schlesinger, Julius	{ Walmer - villa, Bradford, Yorkshire.
Morel, Victor	9A, King Edward-street, Lambeth-road, S.	Shaw, Benjamin	8, Cambridge-square, W.
Moreton, John	{ 22, Bush-lane, Cannon-street, E.C., and Wolverhampton.	Shepperson, Allen Thos.	Dulwich-hill, Surrey, S.
Morrish, F. E.	Lancaster - buildings, Liverpool.	Sheriff, Robert French ...	{ 14, Jermyn-street, S.W., and Inner Temple, E.C.
Murchison, Sir Roderick I., D.C.L., F.R.S., &c. ...	16, Belgrave-square, S.W.	Shirreff, Geo. W.	4, Bank-chambers, E.C.
Murray, Thos.	12, Copthall-court, E.C.	Sidebottom, Alfred	Crown-street, Camberwell, S.
Myers, Abraham Nathan .	144, Leadenhall-street, E.C.	Silk, Robert, junr.	8, Long-acre, W.C.
Navroji, Dádábhai	32, Great St. Helen's, E.C.	Simons, George	The Park, Nottingham.
Negroponte, Augustus ...	{ Edge-lane, Stretford, Manchester	Simonsen, Michael L.	35, Finsbury-circus, E.C.
Neighbour, Geo. L.	127, High Holborn, W.C.	Simpson, Wm. Fred.	456, West Strand, W.C.
Neilson, Walter Montgomerie	{ Hyde-pk. Locomotive Works, Glasgow.	Skey, George	Bonehill-lodge, Tamworth.
Nichols, Richard Peter ...	25, Maida-hill West, W.	Smith, David	109, Fore-street, E.C.
North, Thomas	Basford-hall, nr. Nottingham.	Smith, F. Warwick	{ 180, Upper Thames-street, E.C.
Oram, Richd. E. Sprague	1, Bellevue, Stalybridge.	Smith, Hy. Nickison	{ 2, Compton-road, Canonbury, N.
Paget, Frederick	37, Old Broad-street, E.C.	Smith, James	Barton-villa, Malton.
Paget, Thos. Tertius ...	Humberstone, Leicestershire.	Smith, R. M.	Edinburgh.
Palmer, George	Reading.	Snelgrove, John	11, Vere-st., Oxford-st., W.
Pares, John	{ Elm-grove, Binfield, Berks and Prescott Manor, Banbury.	Snowden, Thomas	Stockton-on-Tees.
Parker, Henry T.	{ 3, Ladbroke-grdns., Kensington-pk., Notting-hill, W.	Sparrow, Charles E.	{ 11, New North-street, Red Lion-square, W.C.
Parker, James	Gt. Baddow-house, Chelmsford, Essex.	Sparrow, Wm. Mander ...	{ Penn-court, near Wolverhampton.
Palk, Sir Lawrence, Bart., M.P.	Haldon-house, Exeter.	Spooner, William	Walton-lodge, Stafford.
Pease, Henry	Pierpoint, Darlington.	Square, Elliot	16, Notting-hill-terrace, W.
Pease, Joseph	Southend, Darlington.	Stenhouse, John, LL.D., F.R.S.	17, Rodney-street, Pentonville, N.
Peterkin, James Grant ..	Grange-hall, Forbes, N.B.	Stone, David H.	33, Poultry, E.C.
Phillip, George	32, Fleet-street, E.C.	Stovin, The Rev. Charles Frederick	Leigh-hill, Cobham, Surrey.
Phillips, Robt. Needham	The Park, Manchester.	Tansley, Alfred John ...	Luton, Beds.
Phillips, Thomas Adams	Gibson-square, Islington, N.	Taylor, T. G.	10A, King's Arms-yard, E.C.
Phythian, T.	430, West Strand, W.C.	Taylor, Wm.	{ Sunny-field, near Braintree, Essex.
Pitman, Frederick	20, Paternoster-row, E.C.	Thompson, H. Ayscough	On the Bank, Highgate, N.
Pittar, Park	16, Kensington-pk.-gdns., W.	Toms, Thos. Harris	{ Higham Lodge, Walthamstow, N.E.
Pocock, Samuel John ...	{ 6, Woburn-place, Russell-sq., W.C.	Tongue, John Garrett ...	34, Southampton-bdgs., W.C.
Poole, H. G.	4, Old Burlington-street, W.	Toogood, Henry	1, Chester-square, W.
Prothero, Francis Egerton, B.A.	The Inner Temple, E.C.	Tredinnick, Richard	{ Mildmay-park, N., and Lombard-street, E.C.
Pryor, Francis	Redruth, Cornwall.	Treggon, Wm. Thos.	22, Jewin-street, E.C.
Purcell, Alfred	80, Cornhill, E.C.	Treloar, Thomas	42, Ludgate-hill, E.C.
Puttick, James Fell	47, Leicester-square, W.C.	Turner, Benj. Brecknell..	31, Haymarket, S.W.
Reuter, Simon	{ Moorgate-st. Chambers, Moorgate-street, E.C.	Turton, Thomas	Portwood, Stockport.
Reynolds, Chas., Wm.	2, Eaton-place, S.W.	Tyler, Sir Jas.	Pine-house, Holloway, N.
Ricardo, David	{ Gatecombe, Minchinhampton, and 29, Piccadilly, W.	Tysoe, John	Manchester.
		Unna, Ferdinand.	{ Vernon-lodge, Addison-road, Kensington, W.
		Utterton, Rev. Jno. Sutton (Archdeacon of Surrey) ..	Farnham, Surrey.

Vallance, H. Wellington.	{ 3, St. George's-road, Eccle-
Vallentin, James	{ ston-square, S.W.
Waggett, John	{ Shearn-lodge, Walthamstow,
Walker, Sir Edwd. S.	{ N.E.
Walsh, David H.	{ Stanley - terrace, Kensington-
Wardell, Wm.	{ park, W.
Watkins, William	{ Berry-hill, Mansfield, Notts.
Watson, Peter	{ Pembroke-house, Pembroke-
Watts, Robt.	{ road, Clifton, Bristol.
Webb, Chas. Locock.....	{ Abbotsfield, Chester.
Webb, George (Messrs.	{ 52, Lime-street, E.C.
Symes and Co.).....	{ 71, Myddelton-square, E.C.
Wells, George	{ 6, Great Newport-street,
Wheelwright, Wm., jun.	{ W.C.
Whitfield, Geo. C.....	{ Hanover-terrace, Notting-hill,
Williams, Dr. Llewellyn.	{ W.
Wilson, Chas. Edmund...	{ 33, Fenchurch-street, E.C.,
Wilson, Erasmus, F.R.C.S.	{ and 2, Middleton - road,
Wilson, Robert Porter 31,	{ Dalston, N.E.
Wilson, William	{ 12, North-street, Westminster,
Winsor, Wm., F.C.S. ...	{ S.W.
Woolloton, Chas.	{ 16, Upper Woburn - place,
Young, John, Jun.	{ W.C.
	{ 1, Cambridge-place, Kensing-
	{ ton, W.
	{ 9, Leonard-place, Kensington,
	{ W.
	{ 5, Earl's-terrace, Kensington,
	{ W.
	{ 17, Henrietta-street, Caven-
	{ dish-square, W.
	{ 31, Threadneedle-street, E.C.
	{ 18, Ludowick-terrace, Glou-
	{ cester-road, N.W.
	{ 38, Rathbone-place, W.
	{ 246, Boro' High-street, S.E.,
	{ and Lynton-lodge, Clap-
	{ ham-park, S.
	{ 35, King-street, E.C.; and
	{ 47, Mark-lane, E.C.

The CHAIRMAN delivered the following

ADDRESS.

I owe to the favourable opinion of the Council the distinction of appearing before you as their chairman at the opening of a third Session, and I shall endeavour to deserve the confidence of my colleagues by labouring with zeal and constancy to promote the designs of the Society.

In my former addresses from this chair I had to bring under the notice of the Society the great losses it had sustained in the removal by death of many of its members, eminent in science or art, whose labours and skill had contributed in a remarkable manner to the progress of the Arts, the extension of Manufactures and Commerce, and the growth of our national greatness. My duty to night is of a less mournful character, and I have only to direct your attention to the death of one of our members, Mr. Joseph Maudslay, the distinguished mechanical engineer, which occurred in the present year. He was born on the 17th September, 1801, and (originally intended for a ship-builder) the subject of naval architecture was one in which he always took great interest. He was among the first to perceive the advantages of direct-acting engines for marine purposes, and this principle was applied by him

as early as 1828. In 1841 he invented the Annular Cylinder Arrangement, which was applied with success. He contributed much to the improvement of the packets employed in the Channel, and simplified the arrangements for driving screw propellers, and his plan was adopted by the Admiralty. He patented a method of feathering the screw propeller, which is said to have been perfectly successful. His name must now be added to the list of scientific engineers lost to this country, eminent for his professional ability, estimable for his private worth.

The late Sir William Cubitt, whose death occurred but recently, claims some notice at our hands, for although he was not a member of the Society, it will be remembered that he was invested by the Royal Commissioners for the Exhibition of 1851 with absolute power to arrange with Messrs. Fox and Henderson all the details connected with the building for that Exhibition, and to superintend its construction, a duty which it need hardly be said he most ably discharged. The service thus rendered was recognized by Her Majesty, who conferred upon him the honour of knighthood. He was early distinguished for his knowledge of mechanical engineering, in which branch he introduced some ingenious improvements, among which are the improved windmill sails now almost universally adopted. He attained much eminence as a civil engineer, and amongst his principal works may be mentioned the South-Eastern and Great Northern railways; the gigantic floating landing stages at Liverpool, and the iron bridge at Rochester.

A picture, painted by Nasmyth, of the Suspension-bridge across the Tweed, constructed on the principles laid down by the late Sir Samuel Brown, has been bequeathed to the Society by his widow, Lady Brown, and it is satisfactory to the Council to record this proof of the esteem with which the Society was regarded by one who largely applied the science of mechanics to the practical business of life, and who, although he did not originate suspension bridges, yet, by the introduction of what I believe is still known as the bar link, greatly extended the use of chains made of bar iron, as well in the manufacture of iron cables for ships, as in the construction of suspension bridges and landing piers. The bar link was employed for the Chain Pier at Brighton.

The International Exhibition of works of industry and art, to be holden in the ensuing year, largely engaged the attention of the Council before and during the last Session. A narrative of their proceedings, in relation to the Exhibition, previous to the opening of the last Session, was contained in the address then delivered. The correspondence of the Council with the Commissioners for the Exhibition of 1851,

and with the Trustees for conducting the Exhibition of 1862, embraced several important questions, including the site of the building, the provision of the necessary funds for the undertaking, the incorporation of the Trustees by the authority of the Crown, and their relations with the Commissioners for the Exhibition of 1851. That correspondence having been brought to a satisfactory conclusion, the acceptance of their trust was signified by the following letter from the Trustees :—

London, November 22nd, 1860.

SIR,—We have to acknowledge the receipt of your letter of yesterday, enclosing the copy of a communication from Her Majesty's Commissioners for the Exhibition of 1851 to the Council of the Society of Arts, in which the Commissioners express their general approval of the object which the Society has in view in organising the Exhibition of 1862, and their willingness to render such support and assistance to the undertaking as may be consistent with their position as a chartered body, and with the powers conferred upon them by their Charter of Incorporation.

Under these circumstances we have to request that you will intimate to the Council of the Society of Arts our willingness to accept the Trust which the Council and the Guarantors have in so flattering a manner expressed a wish to repose in us, on the understanding that the Council will forthwith take measures for giving legal effect to the Guarantee, and for obtaining a Charter of Incorporation satisfactory to us.

We have the honour to be,

Sir,

Your obedient servants,

(Signed)

GRANVILLE,
CHANDOS,
THOMAS BARING,
C. WENTWORTH DILKE,
THOMAS FAIRBAIRN.

P. Le Neve Foster, Esq.,
Secretary to the Society of Arts.

When the Commissioners for the Exhibition of 1851 agreed, at the request of the Council, to provide a site for the Exhibition of 1862 rent-free, and to grant to the Society a lease for 99 years of the permanent portion of the buildings, they stipulated that such buildings should not cover more than an acre of ground, nor cost less than £50,000.

In the month of January last the Council were informed by the Trustees that, with a due regard to the interests of the Exhibition, they would not be justified in expending more than £20,000 on the part of the site intended to be leased to the Society, especially as the average cost per acre of the whole Exhibition building was estimated not to reach £12,000, and they requested the Council to ask the Commissioners to be satisfied with an expenditure of £20,000 upon that portion of the building.

In accordance with the request of the Trustees, which was transmitted by the Council to the Commissioners for the Exhibition of 1851, their assent was signified to the proposition of the Trustees, upon condition that they should hereafter expend, out of surplus funds which may arise from the Exhibition, so much money, not exceeding, with the original cost of the

works, £50,000, as will, in the judgment of the Commissioners and Trustees, be requisite to render the architectural character of that portion of the building suitable for the objects for which it is to be employed by this Society.

Various meetings with the Trustees and their solicitor, and also with the Counsel and Solicitor of the Bank of England, were attended by your chairman and secretary, with the view of adjusting the conditions of the Charter of Incorporation, as well as the Guarantee Deed; and the forms of both instruments having been settled in a satisfactory manner, a petition to the Crown for a Charter was presented by the Society. The Charter, having received the approval of the law officers of the Crown, was sealed on the 14th February last, and printed in the Society's *Journal* of the 22nd February, and its chief provisions may be thus described :—

Earl Granville, K.G., the Marquis of Chandos (now Duke of Buckingham), Thomas Baring, M.P., Charles Wentworth Dilke, the younger, and Thomas Fairbairn, the Trustees named by the Society, are incorporated by the name of "The Commissioners for the Exhibition of 1862," and are entrusted with the following amongst other powers, namely, to obtain a site from the Commissioners for the Exhibition of 1851, on a portion of their estate at Kensington Gore, and expend a sum not exceeding £50,000 on buildings of a permanent character; to render an account of their receipts and payments for audit; and to certify whether the undertaking has been attended with gain or loss. And if, irrespective of the value of the permanent buildings, there shall have been a loss, and the Society shall consent to bear such loss, the Commissioners are to secure to the Society a lease of the permanent buildings, erected on the site reserved for the Society; but if the Society shall not require such lease, the Commissioners are to sell the permanent buildings; and in case a gain should attend the undertaking, without resorting to a sale of such permanent buildings, they are to be left standing for the Society. The Commissioners, if desired by the Society, shall pay the Commissioners for the Exhibition of 1851 a sum not exceeding £10,000, for reserving 16 acres, or thereabouts, of their land as a site for an Exhibition of the products of industry and art, to be held in the year 1872. And in case a less sum than £50,000 shall have been laid out on the buildings intended for the Society, the Commissioners shall expend, out of their surplus funds, in the completion of such buildings, in a manner suitable for the objects for which they are to be employed, so much of the unexpended portion of the sum of £50,000 as in the judgment of the Commissioners for 1862, jointly with that of the Commissioners for the Exhibition of 1851, may be requisite.

And if, after such payment and expenditure, there shall remain a surplus, it is to be applied for such purposes connected with the encouragement of Arts, Manufactures, and Commerce as shall be determined by the Guarantors, or the major part in value of those present at a meeting of their body, to be held for the purpose of directing the disposition of such surplus.

The plans of the Society having thus received the gracious approval of her Majesty, the Council transmitted the Charter to the Commissioners for the Exhibition of 1862, and received the following letter from their secretary :—

Council Office, Feb. 20, 1861.

SIR,—I am directed to acknowledge the receipt of Mr. Foster's letter of the 16th of February, enclosing the Charter which has been granted to Earl Granville, K.G., the Marquis of Chandos, Mr. Thomas Baring, M.P., Mr. C. Wentworth Dilke, and Mr. Thomas Fairbairn, incorporating them as The Commissioners for the Exhibition of 1862.

The Commissioners, on the 22nd of November last, agreed to act, after a guarantee had been promised to such an extent as to show a strong opinion in the public mind that the time for holding a second International Exhibition had arrived; after the guarantors had expressed an opinion that the absolute control of the undertaking ought to be entrusted to five gentlemen, named by them; and after the Commissioners of the Exhibition of 1851 had intimated their approval of the project, and their confidence in the proposed mode of management, and had promised their support and assistance. The Commissioners, therefore, gladly accept a Charter which conveys to them her Majesty's gracious assurance that she is earnestly desirous to promote the holding of an International Exhibition of Industry and Art in the year 1862, and that she is pleased to sanction the proposed arrangements.

The powers conveyed by the Charter will, however, be practically inoperative until the Deed of Guarantee has been executed. When this has been done, the Bank of England has agreed to advance the necessary loan of money on liberal terms. The Commissioners therefore desire me to request that you will represent to the Council the necessity of having the deed signed as soon as possible.

The Commissioners, unwilling to lose valuable time, have, during the interval required for the preparation of the requisite legal powers, taken such provisional steps as their position permitted.

The most pressing point was the building required for the Exhibition. In 1850, notwithstanding the possession of considerable funds, and the assistance of the most eminent architects and engineers, seven months elapsed before a design was adopted. The Commissioners therefore felt that if they postponed the consideration of this subject until they were a legally constituted body, the cost of the building would be greatly increased, and a serious risk incurred of its non-completion by the appointed time.

The arrangements made by the Society of Arts, when negotiating for a site on the estate of the Commissioners of 1851, and their arrangement that the Exhibition was to include pictures, a branch of art not exhibited on the former occasion, rendered it necessary to contemplate the erection of a building in some parts of a more substantial character than that of 1851.

A plan was submitted to the Commissioners by Captain Fowke, R.E., who had been employed by her Majesty's Government, in the British Department of the Paris Exhibition of 1855. This design was adapted to the proposed site, and was intended to meet the practical defects which experience had shown to exist both in the buildings in Hyde-park and in the Champs Elysées. It appeared well adapted for the required purposes, and its principal

features were of a striking character, and likely to form an attractive part of the Exhibition. The Commissioners submitted the design to the competition of ten eminent contractors, four of whom took out the quantities. Three tenders (one a joint one from two of the contractors invited) were sent in on the day named in the invitation, but all were greatly in excess of the amount which the Commissioners could prudently spend, with a due regard to the interests of the guarantors.

The Commissioners have, therefore, had under their consideration modifications of the plan, which, without destroying its merits, would materially reduce its cost.

The Commissioners having learnt that the French Government had applied, on the 3rd of November last, to the Foreign Office, to know whether it was intended to hold an International Exhibition in England in 1862, entered into private communication with that Government, from whom they have received satisfactory assurances of support, accompanied by a statement that it had been the intention of the Emperor to hold an International Exhibition in Paris in 1862, had the project not been entertained in England.

The Commissioners also requested the Duke of Newcastle, the Secretary of State for the Colonies, to announce the design entertained of holding an Exhibition, and the intention of the promoters to apply to the Crown for a Charter; and the Commissioners have been informed that his Grace has addressed a communication to that effect to all the Governors of her Majesty's Colonies.

The Commissioners have had under their consideration the revision of the rules laid down in 1851, respecting the award of Prizes, the Constitution of Juries, the affixing of Prizes, the Distribution of Space, the mode of Classification, and also the Organization of the additional Department of the Fine Arts.

When, therefore, the Guarantee Deed has been executed, the Commissioners hope to be able to proceed at once with the construction of the buildings, and to announce the rules and regulations for the arrangement of the Exhibition.

I have the honour to be, Sir,

Your obedient servant,

F. R. SANDFORD.

To obtain signatures to the Guarantee Deed from persons residing in almost every portion of the kingdom was no light labour, but the work was undertaken by the officers of the Society with an alacrity and zeal which ensured the early completion of the task, and the Commissioners were enabled, on the 15th day of March, to publish, in the *London Gazette*, a notice that the Guarantee Deed had been signed for an aggregate amount of £250,000, which sum it had been arranged should be subscribed before the instrument would become binding on the Guarantors. The sums subscribed by 1,092 Guarantors now amount to £438,800, and additional subscriptions are announced each week in the *Journal*.

The intimate connection of the Society with the Exhibition of 1862 has led me to describe, with a minuteness otherwise undesirable, the proceedings of the Council in originating and promoting the undertaking, in order that the members of the Society and the Guarantors, whether members or not, may be accurately informed of the relations of the Society to the Exhibition. The progress of the undertaking will be watched with a very deep interest by the Council, and

they regard its prospects in a very hopeful spirit. The great interest manifested in the Exhibition by foreign countries, as well as by our colonies—the wondrous growth of our manufactures—the extension of our trade—the prodigious increase in our exports and imports, the growth of our population—the increased intelligence of our artisans—the general spread of education—the extended influence of science as applied to the industrial arts—the numberless inventions and improvements by which human labour is diminished, and the powers of production multiplied—the increase in, and rapidity of, our communications with other and distant countries, and the encouragement afforded to international intercourse—the facilities of locomotion in our own land, and the habits of travel thus formed or encouraged—the removal from commerce of injurious restraints which limited the free interchange of commodities—these, and other agencies which might be suggested, will multiply to an enormous extent the present attractions and the future influence of the Exhibition of 1862.

The subject was so ably treated at the close of our last Session by Mr. Hawes, a Vice-President of the Society (who read a paper at an evening meeting, when his Royal Highness the President occupied the chair), that I cannot do better than recommend those who wish to know the grounds on which we regard the Exhibition in a hopeful spirit, to study the facts and reasoning of that interesting paper.

Of the activity with which the labours of the Commissioners have been conducted we have satisfactory evidence in the progress of the buildings which are to form the temporary dwelling of the productions of Industry and Art to be there exhibited—in the numerous Committees of advice they have called into existence—in the various Foreign and Colonial Commissioners with whom they have entered into relations, and in the decisions they have promulgated for the classification of articles, and the guidance of exhibitors.

The paper read by Mr. Hawes indicated with much force the great importance of facilitating the visits to the Exhibition of working men, with their wives and children, by fixing a low charge for their admission on one or more days of the week, thus encouraging their attendance in large numbers—not for a single visit only, but as often as they can avail themselves of the opportunities there afforded for acquiring valuable information as well as enjoying agreeable recreation. He truly said that the object of International Exhibitions is not to amuse the idle but to teach the industrious—not to instruct classes, but to educate nations, and to show to all the part taken by each in the labour market of the world.

The duties to be performed by the Trade and other Committees appointed in our own country,

to advise and assist the Commissioners, are of great importance and much delicacy; and the success of our manufacturers will be influenced by the discretion and firmness manifested by those Committees. Foreign Governments have appointed Commissioners supplied with public funds to direct and superintend the exhibition of the products of their respective countries, and by them the products of those countries will be severely scrutinized, so as to ensure a selection which shall represent their prime productions, or the best specimens of their best workshops and factories.

Let it, therefore, be our aim to exhibit the best selected specimens of our industry and art, recollecting that superiority in kind, and not excess in quantity, is the test by which the challenge we have given to the world's industry is to be determined. Opportunities neglected do not recur, and the industrial rivalry we have evoked must be pregnant with results of great moment to a country which is regarded as the workshop of the world—of good, if our opportunity is wisely used; of evil, should it be unhappily neglected.

The Council will consider in what manner the Society can assist in rendering the sojourn of our foreign friends, who may visit the Exhibition, most agreeable to them, and most conducive to the promotion of international interests. By a genial and hospitable reception, and by considerate attentions, on the part of the English people, those who come amongst us as strangers will part from us as friends, and we shall employ an occasion of generous rivalry in exhibiting the products of the world's industry to strengthen the bonds of amity between kindred nations.

The preliminary measures for holding the Exhibition of 1851 were organised by the Society, under the direction of their President, and the plan then sanctioned by His Royal Highness included the establishment of periodical Exhibitions. Nevertheless, but for the active exertions of the Council, and the generous support of the members of the Society, the Exhibition of 1862 would not have been undertaken, and the Exhibition of 1851 might have had no successor.

The Charter incorporating the Commissioners for the Exhibition of 1862 recognises the active part taken by the Society, previously to 1851, in establishing from time to time Exhibitions of the products of industry and art, which exhibitions it is declared resulted in, or conducted to, the Exhibition of the works of industry of all nations in 1851, and it also recognizes the desire of the Society that facilities should be afforded for holding, from time to time, International Exhibitions.

The recognition by the Crown of the functions which have been discharged by the Society, in relation to International Exhibitions, imposes on the Council the duty of extending

their usefulness, and recording their progress as agencies of much importance for the encouragement of Arts, Manufactures, and Commerce. Advantage should therefore be taken of any suitable opportunity afforded by the approaching Exhibition, so to strengthen the links by which the Society is connected with International Exhibitions as to render the promotion of their periodical recurrence one of the recognised objects of the Society.

Should the Exhibition prove a great success, the Charter secures to the Society (as I have already mentioned) the possession of the central portion of the building erected for picture galleries to the extent of an acre, and the Commissioners are required to expend out of the surplus funds so much money (not exceeding with the original cost of the works, £50,000,) as, in the judgment of the Commissioners of 1851 and 1862, shall be required to render the architectural character of that portion of the building suitable for the objects for which it is to be employed by the Society. Any further surplus will be at the disposal of the guarantors, and those gentlemen will doubtless be prepared to co-operate with the Council in rendering future exhibitions as secure as possible.

As the success of the Exhibition could not depend, to any great degree, on the external decorations of the buildings, no such decorations are included in the contract of the Commissioners with the builders. But as the buildings are susceptible of much decoration, it has been thought desirable to originate a subscription, which was begun by Earl Granville, the Chairman of the Commissioners, for the purpose of making experiments in the employment of mosaics on the external walls of the front in Cromwell-road. If those mosaics are successful they will give to the buildings a character which is new in this country, and especially suitable to the climate, and which is hardly to be found on any building north of the Alps. Those of our members who feel an interest in the employment of mosaics in the decoration of buildings will find the subject lucidly expounded in a paper "On the Art of Mosaic, Ancient and Modern," read by an accomplished member of the Society, Mr. Digby Wyatt, on the 3rd February, 1847, and printed in our Transactions for that year. He defines mosaic as the art of arranging materials, which, individually, are artistically inexpressive, so as to produce a whole subservient to architectural decoration, and says, that taking the form of either pavement or mural decoration, the art has been connected with most of the noblest efforts of architectural genius.

The simplest form of mosaic, or what may be regarded as closely allied to that art, is the encaustic tile, which is said to have been in universal use in England from 1300 to 1500, but

was not again revived until 1830, when a patent was obtained for the preparation of encaustic tiles, with which the name of Minton has been generally associated, and which have been extensively made by many manufacturers of pottery. The second stage in the revival of the art of mosaic was the invention of Mr. Singer, who sought to produce a perfect imitation of the ancient tessellated pavement of the Romans, by the employment of a very ingenious machine for producing clay properly manipulated in the form of tesserae, or small cubes, uniform in size, colour, surface, and hardness, and which were burnt and partially vitrified. The third stage in the revival was the discovery, by Mr. Prosser, of Birmingham, in 1840, of an improvement which carried one branch of the art to a high point of perfection, and which consisted in subjecting china clay, when reduced to a dry powder, to strong pressure between steel dies, whereby it was converted into a compact substance of much hardness and density, less porous and much harder than porcelain uncompressed and baked in the furnace. This discovery was applied by Mr. Prosser to the production of shirt buttons, and has also been extensively employed for this purpose in France, but was employed by Mr. Blashfield in the formation of tesserae, made for him by Minton, and used with much success in many large works, one of his earliest specimens being the pavement of the hall of this Society which was jointly presented by Messrs. Blashfield and Minton.

May we not adopt the concluding passages of Mr. Wyatt's paper, and say that the noblest works of antiquity derive much of their beauty from form, much from carving, much from colour, but more from the perfection of the industrial arts employed in their construction, and happy it is for this Society to be regarded as the nursing mother of such arts. The applicability of mosaic, as an essential element of decoration, can scarcely need argument. "Its glowing colours would revive our drooping taste for the rich and ornamental, and its imperishability would serve to perpetuate the fact that England once possessed and cherished a decorative art somewhat more enduring than *compo*."

It will be in the recollection of many of our members that the Society obtained a full report on the Paris Exhibition of 1849, through the valuable services of Mr. Digby Wyatt, whose paper proved to be of great use in maturing the arrangements for our own Exhibition of 1851. The reports ordered by the Board of Trade on the Paris Exhibition of 1855, made it unnecessary that the Society should prepare any similar report on that Exhibition, but it will be remembered that several hundred of our Members visited Paris on that occasion.

With respect to the Florence Exhibition, after making inquiries on the subject, the Council

learnt that neither our own Government, nor the Commissioners for the Exhibition of 1851, or of 1862, intended to send a deputation to Florence, and they therefore resolved on taking the necessary steps to insure a full investigation into this, the first Exhibition of the industrial and artistic productions of the Kingdom of Italy. They have been fortunate in again obtaining the experience of Mr. Digby Wyatt, who has engaged to furnish a report on the objects of fine and decorative art exhibited at Florence. Mr. Winkworth, a Vice-President, who reported on the silk manufactures exhibited in both the London and Paris Exhibitions, has kindly undertaken to prepare a report on the silk and other industrial productions in the Florence Exhibition. He was accompanied by your Secretary, who will report on the general statistics of the Exhibition, as well as on subjects which may be left unnoticed by Mr. Wyatt and Mr. Winkworth. Those gentlemen have been requested to bring under the notice of the Council whatever is calculated to benefit the forthcoming Exhibition, or future International Exhibitions, and their reports will form papers, to be submitted to members at our evening meetings during the Session, or published in the *Journal*.

The results of the Society's examinations for the present year were laid before the Tenth Annual Conference of the representatives of the Institutions in Union, and of the Local Educational Boards with the Council, held at the Society's house on the 18th of June last. It thus appears that the previous examination of 839 candidates was conducted by 73 local boards at 81 places or centres of examination; that 750 candidates underwent the final examination, of whom 133 were unsuccessful and 617 obtained certificates; that 1079 papers were worked, and 842 certificates awarded, of which 216 were of the first class, 287 of the second class, and 339 of the third class, and that for 237 papers, or 22 per cent. of the whole number, no certificate was given. Twenty-one first-class prizes of £5 each, and sixteen second-class prizes of £3 each, were gained by candidates. Ten prizes of £5 each were awarded to Institutions whose students obtained first-class prizes; and four prizes of £10, £8, £6, and £4 respectively, were awarded to Local Boards. In eight subjects of examination no first class certificate was given, and no prize awarded. Of the 839 candidates who underwent the final examination, 597 were examined in England and Wales, 231 in Scotland, and 11 in Ireland.

There has been a large increase this year in the work done, as will be seen by the following statement:—

Candidates who passed the final examination in 1859, 368; 1860, 516; 1861, 617.

Papers worked in 1859, 766; in 1860, 821; in 1861, 1,079.

Certificates awarded, 1859, 540; in 1860, 556; in 1861, 842.

Distributed in money prizes to Candidates, Institutions, and Local Boards, 1859, £179; 1860, £210; 1861, £231.

Although the number of papers worked in 1861 shows an increase on the whole of 25 per cent. over those worked in 1860, yet in English History and English Literature, the increase has only been from 82 papers in the former year to 83 in the latter; and I must again repeat the regret I expressed on two former occasions, that our students do not familiarise themselves in greater numbers with the history and literature of their own country, furnishing as those would do, a valuable discipline of the intellect, and a source of very pure enjoyment. In the applied sciences there was an increase in the number of papers worked, but the number of candidates in these departments is far below what we might expect when we regard the importance of a knowledge of chemistry, mechanics, agriculture, horticulture, mining, and metallurgy applied to the arts of production.

The reports of the Examiners appear for the most part to recognise an improved acquaintance on the part of the students with the subjects of examination, and the Secretary has reported that increased attention is given in the various Institutions to systematic teaching, and less to desultory lectures; but the examiners in chemistry, agriculture, and botany remark, that the students in those subjects have trusted to books for their knowledge, and have not devoted a sufficient portion of their time to the laboratory, the farm, the field, or the garden.

The Council recognise, with much satisfaction, the success which has attended the middle class examinations, established by our great Universities of Oxford and Cambridge, directed as they are to the same ends as our own examinations, although appealing to a class of students who have enjoyed greater educational advantages than the candidates for the certificates and prizes of the Society.

The Society's programme of Examinations for 1862 has been published and widely circulated, and supplies ample details for the guidance of Local Educational Boards, as well as of students who may desire that their efforts for self-culture shall be tested by the Society's Examiners. The Council have been authorised to notify the intention of H.R.H. the Prince Consort to offer annually a prize of twenty-five guineas to the candidate who, obtaining a Certificate of the first class in the current year, shall have obtained in that year, and the three years immediately preceding it, the greatest number of such certificates. This prize cannot be taken more than once by the same candidate. It will be accompanied by a certificate

from the Society setting forth the special character of the prize, and the various certificates for which it was granted. Several friends of the Society have authorised the Council to offer additional prizes for Practical Mechanics, Animal Physiology in relation to Health, Agriculture, Botany, Mining and Metallurgy, Political, Social, and Domestic Economy, and English History and Literature. The Council gratefully appreciate the thoughtful interest which His Royal Highness our President has always manifested in the labours of the Society, and the liberal encouragement to the work of self-instruction which the valuable prize now offered will give to the intelligent and persevering student. To win that prize will be the highest distinction within the reach of the candidates for the Society's rewards.

In the month of February last a meeting of the representatives of various educational bodies, and of certain members of the Council with the chairman of the Board of Examiners, was held at the Society's house, to consider proposals which were laid before the meeting by the honorary secretaries of the Southern Counties Adult Education Society, with the view of forming a Central Committee for elementary examinations held by provincial and district Unions of Institutions, Adult Educational Societies, and Local Boards in connection with the Society of Arts, and the subject was further considered, and the constitution of the Central Committee settled at the Tenth Annual Conference held on the 18th of June last. The constitution of the Central Committee, as well as the objects sought by its formation, will be sufficiently explained by the following extracts from the Society's Programme of Examinations for 1862:—

1. The Central Committee consists of two representatives of each Provincial and District Union and Adult Education Society, four members of the Council of the Society of Arts, the Chairman of the Society's Central Board of Examiners, and six representatives of Local Educational Boards.

2. The object of the Central Committee is to promote uniformity of action, and a fixed standard, in the Elementary Examinations held by the various bodies in connexion with the Society of Arts.

3. The Central Committee provides for common use a Scheme of Two Elementary Examinations, consisting of two sets of papers, one suited for Junior, the other for Senior Candidates, with corresponding Forms of Certificate, to be awarded by the local authority under which the examination has been conducted.

4. The Certificate of a Senior Candidate, of sixteen years of age, will be received, without any further "Previous Examination," as a "pass" to the Final Examinations of the Society of Arts, if accompanied by a Certificate from the Local Board or Union, that the Candidate is fit to be examined in the special subject or subjects in the Society of Arts' Programme in which he or she proposes to be examined.

5. The Society of Arts prints and distributes, at cost price, the Examination Papers, Certificates, and Circulars, and provides for the correspondence, of the Central Committee.

6. The Elementary Examinations are not intended to be in any degree competitive. They are open to persons of either sex or of any age.

7. To prevent the possibility of unfair advantages being taken from a premature knowledge of the Examination papers, the Examinations must be simultaneous everywhere.

The designs of the gentlemen by whom the organisation of the Central Committee was promoted, are fully explained in a circular letter, addressed by the Society's Secretary to various Provincial Unions, on the 22nd February last, and printed at pages 210 and 211, Vol. IX. of the *Journal*.

The importance of evening schools and classes is now universally recognised, and though the provision for those objects is, as yet, in no adequate proportion to the want, it appears from the report of the Committee appointed to inquire into the state of popular education in England, made in the present year, that there now exist 2,036 evening schools, containing 80,996 scholars, in which the instruction is almost entirely elementary. The school life of those children whose parents are employed in manual labour must ever terminate at a very early age, and the tendency of late years has been rather to accelerate than retard the removal from school to work, and to shorten the duration of school life.

It appears from the report of the Commissioners that 65 per cent. of the children in elementary public schools are between the ages of 6 and 12, few go before 6, very few before 3; that attendance diminishes rapidly after 11; and ceases almost entirely at 13, only 5 per cent. of the children at our day-schools being over that age.

Very much of the instruction acquired before 13 in the day-school will be lost before 18 in the work-shop if not preserved and extended in the night-school, and in proportion as the day-school is extended, will be the growth of a consciousness on the part of our young people that the night-school should complete what the day-school has begun. It has been found, as the result of careful inquiry by the Commissioners, that two millions and a half of children are now on the books of week-day schools, and that upwards of two millions of the children of working men are receiving education on week-days. Year by year, hundreds of thousands of children exchange school for labour, and yet of this vast array our night schools provide for less than a hundred thousand young persons. Can Christian philanthropy present higher aims than the intelligent and religious teaching and training of these adolescents during those years when the passions are strong and the allurements to vicious gratifications well nigh overwhelming. And without neglecting its other objects, the Society has sought to encourage every suitable agency for the systematic instruction of the adult student, rewarding the meritorious by certificates of excellence, distinguishing the most successful by prizes of a substantial character, and affording

to all the opportunity, by judiciously conducted examinations, of measuring their strength, discerning their short-comings, and obtaining at length the just rewards of persevering study.

In the course of the present year a beginning has been made in founding a Working Man's College in the City of London: and the encouragement which the undertaking has already received may be regarded as an earnest of its ultimate, and we hope, early success. The movement originated with the Metropolitan Evening Classes, whose meetings were held, first in Crosby Hall and afterwards in Sussex Hall, and who succeeded in the present year in obtaining, at the Society's examinations, 15 first-class certificates, and 4 first-class and 1 second-class prizes. Hitherto, the metropolitan candidates at the Society's examinations have been few in number, compared with other places; and in the present year there have been 176 candidates at Glasgow and 75 at Leeds, whilst the metropolitan candidates were only 61.

The Council have been always mindful that the intelligent instruction of those who are engaged in manual labour conduces to advance the skill, refine the taste, and enlarge the faculties of the working man. The education, not alone of the head, but also of the hand, eye, and taste of our artisans and mechanics is needful for their advancement, and the Council would gladly encourage any agency for stimulating and testing that practical skill and dexterity so necessary to the success of the artisan and mechanic. With this view, the Council welcomed the efforts of the Company of Painters' Stainers of the City of London to promote, by public exhibitions of the works of artisans in decorative arts, as well as by instruction in classes and by lectures, the knowledge, skill, and taste of the workmen employed in those handicrafts. The Council, at the request of the Company, associated three gentlemen eminently qualified for that duty with the judges named by the company, and voted a contribution of ten guineas to the fund formed for offering prizes to the successful competitors in marbling, in graining, and in decoration in oil or distemper. An exhibition was held in Painters' Hall, on the 1st of June last, which was open to foreign and native workmen, but the result does not appear to have realised the expectations of the company. The object is full of importance, and at the last Conference between the Council and the representatives of the Institutions in Union with the Society, it was unanimously resolved:—

“That as competitive exhibitions of works of skilled labour have a powerful tendency to encourage improvement in manufacturing industry, and at the same time to promote mental cultivation, it is desirable that such exhibitions should be held in connexion with the principal provincial Institutes, wherever practicable, as well as in the Metropolis, and that Schools of Science and Art be specially invited to co-operate therein.”

In most of the Continental States, institutions for industrial instruction are found to supply a knowledge of the principles of those sciences which are of daily application to the practical business of life, and to familiarise the student with the raw materials of production, with the agents, whether mechanical or chemical, by which the raw material is converted into the finished product, and with the arts of design by which a purer and more cultivated taste is diffused. Freedom of commercial intercourse has taught our countrymen that we possess no monopoly of inventive genius or practical skill, and that if we would maintain our position in the van of manufacturing industry we must secure for our countrymen at least equal advantages to those enjoyed by their foreign rivals.

The report presented by the Council at the last Annual General Meeting in June, contained a narrative of their proceedings in relation to Artistic Copyright during the last session of Parliament, when a bill for the protection of copyright in works of art was read a second time in the House of Commons; but it was found impossible to proceed further with the measure by reason of the pressure of public business. The bill was originally framed under the directions of the committee appointed by the Council in the Session of 1857-8, of which committee Sir Charles Eastlake, President of the Royal Academy, is chairman; and was introduced into the House of Commons by Lord Westbury, then her Majesty's Attorney-General, who manifested a deep interest in the measure, and devoted a large amount of valuable time to the revision and improvement of the Bill which had been framed by the committee.

The chief object of the Bill was to secure for every artist during his life, and for a limited period after his death, a copyright in such works of Fine Art as he shall have designed and executed, whether pictures, sculptures, architectural designs, engravings, or photographs, and thus to confer on artists similar protection in the enjoyment of their works to that which is given to authors by an Act of the present reign. The Bill for amending the law of copyright in books, and affording greater encouragement to the production of literary works of lasting benefit, when originally introduced into the House of Commons in 1837, contained clauses for the protection of the arts of painting and engraving, but the measure was ultimately confined to literary productions; and the amendment of the laws relating to painting, engraving, and sculpture, was deferred for separate consideration. The Council believe that the further attention which has been given to the subject has served to strengthen the conviction that an artist has some property in the creations of his own mind and the productions of his own skill and labour; and that it ought no

longer to continue the law of this country that from the moment the conceptions of the artist are embodied on the canvass or sculptured in the marble, they cease to belong to their author, and may be pilfered by men who, when they cannot even imitate, can at least disfigure works which a lofty genius may have inspired.

The Council look with much confidence for a continuance of the valuable services of Lord Westbury in the promotion of the measure, and trust he will be induced to introduce a bill into the House of Lords in the present session, and by his able advocacy, to ensure for artists that right to the enjoyment of the creations of their minds, which is the natural and undisputed reward of the rudest industry; and thus to recognise our obligations to men whose just claims to distinction are oftentimes disregarded, although their labours have provided some of the highest and purest pleasures.

The extent and character of the exclusive rights which ought to be conferred on the authors of useful inventions, and the means whereby such rights should be acquired and preserved, will naturally be subjects of controversy, especially in an age characterised like our own by industrial operations of great magnitude and by almost uninterrupted progress. Letters patent, for inventions, owed their existence to the Royal Prerogative, and their operation was limited to fourteen years by the statute of Monopolies passed in the reign of James the First. Extensive changes in the manner of obtaining letters patent, and some in their operation, when obtained, were made by the Act for amending the law for granting patents for inventions, passed in 1852. That statute was preceded by a very extensive inquiry undertaken by the Society and conducted by a Committee of their body appointed on the 31st day of January, 1849, for promoting the legislative recognition of the rights of inventors.

The Committee considered, and made known by their reports, the principles of jurisprudence which ought, in their opinion, to govern the rights of inventors; but as their object was to afford simpler and cheaper means of obtaining rights already recognised, and of enforcing them when obtained, the reforms which they suggested were directed to methods of procedure rather than to alterations in the rights conferred on inventors by our patent laws. The legislation of 1852 has not been satisfactory, and the Society's Committee reported on certain features of that legislation, which appeared to them calculated to be unnecessary and troublesome, and likely to occasion failure in the administration of the patent laws. Dissatisfaction with the operation of those laws, as well as objections entertained to the methods of obtaining patents and of enforcing them when obtained, have led to investigations by a joint Committee of the British Association for the Ad-

vancement of Science and the National Association of Social Science.

It will be the duty of the Council to consider any remedial measures which may be proposed and to afford any aid it can give to the task of simplifying and rendering more adequate for its objects the present system of patent law. Some persons eminent in law, legislation, and science, entertain the opinion that no exclusive advantages ought to be conferred on the authors of useful inventions, and the views of the late Mr. Brunel have been often cited in support of that opinion. It would, however, seem that the reasoning by which that opinion is supported is for the most part based on the imperfect character of our system of patent laws, rather than on a denial of the claims of the authors of useful inventions to be suitably rewarded. Useful inventions contribute to the wealth and power of the nation, and the people which benefits by the intellect, skill, and labour of inventors, ought surely to recognise their claims on the commonwealth.

The improvement of the Metropolis, by affording a complete system of sewerage, and an ample supply of pure water; by diminishing atmospheric impurities; by embanking the river; and by facilitating locomotion within and between the several quarters of the wide area of the London of our day, has frequently occupied the attention of the Society, and been forced upon the notice of the public by papers and discussions in this room. In a single decade 400,000 persons have been added to the population of the Metropolis. Its thoroughfares are thronged, not only by its own population thus increased, and by the numerous passengers who daily arrive at and leave the termini of its various railways, but by the countless productions which are either consumed within its borders, or constitute its exports and imports. The magnitude of its commerce is attested by its railways, its docks, and its shipping, and it may suffice to state here that in the year 1860, nearly 20,000 vessels, of an aggregate tonnage exceeding five millions of tons, entered inwards or cleared outwards to or from our Colonies and foreign countries, and upwards of 27,000 vessels, of an aggregate tonnage exceeding four millions of tons, entered or left with cargoes from or for places within the United Kingdom.

Notwithstanding the great rapidity with which long journeys by sea or land may now be performed, so that a traveller may reach Dublin from London in 12 hours; London from Geneva in 26 hours; and Liverpool from New York in eight or nine days; it requires now as much time to cross the Metropolis, whether from north to south, or east to west, as when the journey from Dublin to London occupied three days; from Geneva to London six days; and from Liverpool to New York six weeks or two months.

The thoroughfares and means of locomotion

which sufficed for 1851, are wholly unequal to the wants of 1861, and to provide adequate accommodation for the transit of the metropolitan traffic, involves questions which have hitherto received no satisfactory solution. In a few years districts have been added to the metropolis which would of themselves constitute large cities, and this extension proceeds in an accelerated ratio.

Meanwhile, considerable progress has been made in the construction of subways, which were regarded as visionary in 1851, when a discussion took place in this room on a proposal for combining, with the embankment of the Thames, a terraced highway with a railway arcade and tunnels for water, sewage and gas. What practical difficulties might prevent the completion of such an undertaking, I know not; but whether regarded for its combinations, its grandeur, or its usefulness, such a work would rank with those structures which, more than aught besides, even in their ruins, testify to the greatness and power of the Roman Empire.

The casualties to our commercial marine, and to the men engaged in our fisheries during the last two years, have been unusually large, and it is satisfactory to find, that by carefully watching the movements of the barometer, and by a patient collection and classification of observations relating to the force and direction of the winds, the science of meteorology has acquired an utility and is gradually acquiring an accuracy which will confer on its deductions increased practical value in the navigation of our coasts.

There are few subjects to which the Council has more perseveringly directed the attention of our manufacturers than the importance of lessening the dependence of this country on the American States for a supply of raw cotton. Two papers of much interest were, at the request of the Council, read by Dr. Forbes Watson; one in the Session of 1858-9, on the "Growth of Cotton in India," and one in the Session of 1859-60, on the "Chief Fibre-Yielding Plants of India." The last paper is especially valuable for its large amount of information and its numerous illustrations, furnished at the expense of the Indian Government, but at present my chief attention will be given to the first, which describes the capabilities of our Indian Empire for the growth of cotton.

At the recent meeting of the British Association, it was said by a Manchester capitalist that a capital of 200 millions is embarked in our cotton manufactories, and that four millions of people are in some way or other dependent on the trade in cotton. That the value of our cotton goods yearly manufactured is 80 millions, of which the portion exported is equal to 55 millions. That the cost of the raw material we consume is 40 millions, and that of every 100 pounds of raw cotton consumed, we have

been supplied by the United States with 85 pounds.

The actual weight of cotton imported into this country, from all parts of the world, was, in 1859, 1,225 millions of pounds, and the quantity annually grown in India is estimated by Dr. Forbes Watson at upwards of 2,400 millions of pounds, or double the average consumption of this country. He stated that in one province alone, Berar (where the quality of the cotton grown is second to none in India), a supply could be furnished to this country equal to one-third of our entire consumption; and that Indian cotton can be grown at a rate varying from $1\frac{1}{4}$ d. to $1\frac{1}{2}$ d. a pound, and delivered in England at 4d. per pound, notwithstanding the present imperfect means for the transit of cotton from the interior to Bombay. In the Address which I delivered from this chair, in the year 1859, I ventured to anticipate a time when, by means of increased intelligence and capital, directed to the cultivation of the cotton plant in India, and improved communications with the interior of that country, we should receive from our own dependency, in large measure, a raw product of vast importance to our manufacturing community and the well-being of our population, thus cheapening a material supplied to Europe to a great extent by the United States, and in that country the product of slave labour. In a subsequent address, I intimated that it was impossible to exaggerate the importance of the subject, inasmuch as millions of hands are engaged in, or dependent on, our cotton manufactures, and to them a stoppage in the supply of raw cotton would be equivalent to a food famine.

No one could have anticipated that the apprehensions then expressed would be so soon realised, but we must regard with anxious forebodings the present condition and future prospects of the manufacturers and artisans of Lancashire, where many mills have been either stopped or are working short time on account of the scanty supply and increased price of raw cotton. We are naturally reminded, when considering this question, of the deplorable spectacle exhibited on the other side of the Atlantic, where men of our own blood and language are engaged in mortal conflict, and that great Republic which, but yesterday, constituted the United States of America, is rent asunder by a fratricidal war. To us it is not given to judge the actors in this unnatural strife, but we must unite with every class of our countrymen in lamenting the suffering, devastation, rancorous hatred, and internecine fury which this war of brother with brother has called forth, and will inevitably perpetuate, whatever may be the proximate issue of the conflict.

If we turn our eyes from the western to the

eastern horizon, we find China, with four hundred millions, and Japan, with forty millions of inhabitants, opened to the general commerce of the world, in great measure by the energy and enterprise, seconded by the valour and diplomacy of our countrymen. The present amount of our trade with China, and the recent extension of that trade, exceed the expectations of the most sanguine minds, and confirm in the fullest manner the representations which have been made to us of the great activity, industrial habits, and strong commercial instincts of that remarkable people.

It has been for some years the aim of the Council to collect and diffuse accurate information with respect to the products and resources of our colonies and dependencies, whether peopled by men of our own race and language, the prosperous founders of industrious and intelligent communities, by whom the arts and domestic habits of their fatherland are preserved and extended, as in America, Australasia, and Southern Africa; or whether, as in India, Ceylon, and other of our dependencies, inhabited by races differing from our own in language, modes of thought, habits, and almost all the qualities which constitute national life.

I may point with some satisfaction to many valuable papers read at our weekly meetings, in which the attention of our members has been directed to colonial subjects, as well as to the papers recently inserted in the *Journal* from the pen of Mr. P. L. Simmonds, on the British Colonies and the International Exhibition of 1862.

The aggregate population of our colonies and dependencies is there stated at 195 millions; their import and export trade at 176 millions; their revenue at 44 millions, and the amount of their imports from the mother country at 46 millions, being nearly one-third of our total exports to all countries.

The most remarkable characteristic of our recent colonial history is the rapid growth of those valuable possessions from infancy to manhood; from settlements, ruled by an administrative department in the mother country, to commonwealths, possessing native legislatures, and entrusted with the organisation of their Executive Governments.

Their growth in population, trade, and material wealth has but few parallels. Thus, in South Africa, the export of wool has increased from six millions of pounds in 1851 to 24 millions in 1859; and of wine, from 250,000 gallons in 1852, to nearly 800,000 in 1859.

In North America our colonial population has increased from 2½ millions in 1851, to 4 millions in 1859, and the imports from a sum less than 5 millions in 1850, to more than 9 millions in 1859.

On the Western shores of North America, a province known as British Columbia, has recently

started into existence, and bids fair, at no distant period, to rival Australia. The gold fields of British Columbia will assuredly attract an active, energetic population, whilst its position on the shores of the Pacific must confer on the Colony great importance as a naval station.

The noble Earl who presided with so much ability at the last Anniversary Dinner of the Society, mentioned, on that occasion, as a fact within his own knowledge, that between the year 1847, when he went to Canada as Governor-General of the North American provinces, and 1855 when he left the country, the revenue and trade of those provinces had quadrupled.

In Australia the population has more than doubled in ten years, whilst the aggregate revenue has risen from a million and a quarter to six millions a year, and the imports and exports have increased from eight millions in 1850, to 47 millions in 1858; and it is computed that the gold obtained from Australia in ten years, has exceeded in value a hundred millions sterling.

Our colonies and dependencies, including India, will be well represented at the forthcoming Exhibition, as all, with the exception of the Cape, have entered with ardour into the industrial and artistic rivalry which the undertaking has enlisted.

The Council authorise me to announce that the following papers will be read before Christmas at our evening meetings:—

November 27.—“Comparison of the Year 1851 with the Year 1861.” By Blanchard Jerrold.

December 4.—“On the Building for the International Exhibition of 1862.” By Capt. William C. Phillpotts, R.E.

December 11.—“On Railway Management, from the Traveller's Point of View.” By Thomas Baker, Secretary to the Royal Indian Army Sanitary Commission.

December 18.—“On the Improvements and Progress in Dyeing and Calico Printing since 1851.” By F. Grace Calvert, F.R.S.

In former addresses from this place I indicated the important service the members might render to the Society by introducing amongst us active, ardent, and intelligent men, willing to co-operate with the Council in increasing the influence of a Society which includes many agencies for promoting the well-being of the community. But we do not appeal to our members alone. Our Board of Examiners and our Committees undertake duties of a laborious character, and contribute in various ways and different degrees to the usefulness of the Society.

In a career which now embraces the labours of more than a century, the Society has witnessed many vicissitudes, but although some of its original functions have been undertaken by kindred societies, yours is the only chartered body which seeks to promote manufactures and commerce by enlisting in their service science and art. By your union with mechanics' and other Institutions, and by the encouragement you have afforded to the

systematic instruction of adults, you have lengthened your cords and strengthened your stakes. The number of your members has doubled in the last ten, and quadrupled in the last fifteen years. The last Session witnessed the election of 648 new members, and the Council has had this evening the gratification of notifying the proposal of 306 candidates for election, being nearly thrice the number ever submitted for election at a single sitting. These are proofs that the Society continues to enjoy the sympathy, confidence, and esteem of the public, and they deserve the grateful acknowledgments of the Council.

Increased influence brings increased responsibility as well to societies as to individuals, and we shall be judged hereafter not by the extent of our means of usefulness, but by the manner in which those means have been employed. May it be our constant endeavour to overcome prejudice, secure improvements, advance physical science, and promote social ameliorations. The employment of science in advancing the arts which minister to man's necessities is the characteristic of our age, and when we regard the rapid stimulus thus given to the industrial progress of the nation, we may, in the language of Bacon, say, "No doubt the sovereignty of man lieth hid in knowledge wherein many things are reserved which kings with their treasure cannot buy, nor with their force command."

The Chairman then presented the Medals awarded by the Council at the close of the last Session, as follows:—

To Dr. Edward Smith, F.R.S., for his two papers, "Recent Experimental Inquiries into the Nature and Action of Alcohols as Food," and "On the Uses of Tea in the Healthy System." *The Society's Silver Medal.*

To A. K. Isbister, for his paper "On the Hudson's Bay Territories; their Trade, Productions, and Resources; with Suggestions for the Establishment and Economical Administration of a Crown Colony on the Red River and Saskatchewan." *The Society's Silver Medal.*

To Alexander Redgrave, for his paper "On the Progress of the Textile Manufactures of Great Britain." *The Society's Silver Medal.*

To Dr. Milligan, for his paper "On Tasmania; its Character, Products, and Resources." *The Society's Silver Medal.*

To Charles Ledger, for "The Introduction of the Alpaca into the Australian Colonies." *The Society's Silver Medal.*

To F. Joubert, for "The Application of Photography to the production of Images on Glass, which can be burnt in." *The Society's Silver Medal.*

Dr. MEEKINS said he should venture to propose a vote of thanks to Sir Thomas Phillips for the very able and eloquent address which they had listened to with so much pleasure. Everyone who knew how that gentleman had laboured as Chairman of the Council of the Society, must, he was sure, feel that any thanks they could vote would very inadequately express the feelings which they entertained towards him, for the manner in which he had always discharged the important duties of his position.

Mr. WILLIAM HAWES begged to second the vote of thanks which had been proposed to the chairman, not only for the very able address they had heard from him that

evening, but also for the admirable manner in which he had discharged the duties of chairman of the Society. It might not be within the knowledge of all present that this was the third time Sir Thomas Phillips had kindly undertaken those duties. He was particularly requested by his colleagues to retain that position last year, because it was felt by them that no other member of the council possessed so accurate a knowledge as he did of all that had taken place between the Commissioners for the Exhibition of 1851, the proposed Commissioners for the Exhibition of 1862, and the Society of Arts. Having discharged those duties most ably, the Council felt that they could not do otherwise than request Sir Thomas Phillips to be kind enough again to take charge of the interests of the Society. He hoped that Sir Thomas would have the honour of appearing amongst those who would take an important position in the public proceedings which would attend the opening of the Exhibition of 1862, and if he were in his place on that occasion they might rest assured that not only would the Society be well represented, but its interests would be properly regarded, and would be perfectly safe in his hands; because, as a member of the Society, he (Mr. Hawes) felt that as to it belonged the honour of having first introduced public exhibitions in this country, so it ought also to have not only the honour, but the advantage—whatever it might be—of having been the means of erecting a building which might be available for future Great Exhibitions, and might be otherwise generally employed for the purpose of advancing the Arts and Manufactures of this country, and thus of promoting the objects to which this Society was devoted. Looking back to past times, one could not but feel how important a part this Society had played, not only in the promotion of the arts—for it was in this Society that the first meeting of the Royal Academy was held—not only as regarded manufactures, for here it was that the first public exhibition of new inventions took place, but also as regarded commerce, for he believed it was here that the first series of lectures were delivered on colonial products, a most important branch of our national interests, and a vast amount of information had been from time to time disseminated on that subject in the *Journal* of the Society, showing the large amount of our exports and imports, and the progress which had been made in all the branches of Arts, Manufactures, and Commerce, which had distinguished this country above all others for the last twenty years. In the address of the chairman, two or three subjects of great importance were alluded to, and he (Mr. Hawes) thought there was none of greater moment than that which had been referred to as the Artistic Copyright Bill. He regarded that as a measure which was absolutely necessary to place the artists of this country upon a fair and equal footing with those of foreign countries. Unless something was done in that direction before the Exhibition of 1862, we should run the risk of being deprived of many valuable specimens of painting by modern foreign artists; for when English artists sent pictures to the Paris Exhibition they were protected, but when foreign artists sent their pictures to England there was no protection afforded them by our law, and they were liable to be copied to the injury of the artists. Therefore, if there was one measure more than another which required the active energies of the Society, it was that in which the present Lord Chancellor had taken so great an interest when he was Attorney-General. He was sorry to say that measure was thwarted—not in the House of Lords, where Lord Westbury now was—but in the House of Commons. There appeared to be a jealousy amongst the buyers of pictures against giving protection to artists by a copyright in their works, which one was at a loss to understand; nevertheless it existed, and nothing but a strong expression of public opinion, and the most active exertions on the part of the Society, would, in his opinion, induce the House of Commons to pass a measure which was abstractedly just, and without which artists in this country would never have fair play. Then there was another subject which

required as much attention. The Chairman had referred to the patent law, and to the difference of opinion which the present and past state of that law had excited both in the House of Commons and out of it. A patent was undoubtedly a monopoly, and it was quite clear, in this age of free trade, that a monopoly should only be granted when there was some great public good to be achieved by the person demanding it. To grant a patent for any great invention—to give a man a proper reward for his genius, was fair and right, but he contended that patents ought not to be allowed for small improvements upon a known principle, as this tended very greatly to impede the progress of improvements which led to practical benefit to the community. The chairman had referred to the views of the late Mr. Brunel on this subject. That gentleman had stated that he never thought of taking a patent out for anything, because the moment a patent was applied for other persons came forward with so-called improvements and modifications of the same thing, and although these alleged improvements might never have been brought into practice, they were obliged to buy them off with large subsidies. He (Mr. Hawes) would say, if the present patent law was to remain, let it be made so cheap that there might be a patent for almost anything, and then patents would be practically valueless. The chairman had also referred to the very beautiful discovery in photography, for which the Medal of the Society had been awarded to M. Joubert. It was for such things that the Medal of this Society ought to be exclusively given. When a gentleman brought forward something that was original and beautiful—such as the transference of photographic pictures, which were as it were views of nature brought out of nothing—when those pictures were transferred permanently to glass and vitrified into that material, so as to remain imperishable, and when, moreover, they could be produced at a cost which brought those beautiful objects within the reach of most people—that man deserved to be held up as one whom the public should honour, and as one of the promoters of the Fine Arts in this country. With these observations he had much pleasure in seconding the vote of thanks to Sir Thomas Phillips, not only for the able address he had read, but also for the great interest and zeal he had displayed in the management of the Society during the period in which he had held the office of chairman.

The vote of thanks was carried by acclamation.

Sir THOMAS PHILLIPS begged to express his gratitude to the members for their kindness on this and all other occasions, and to assure them that whatever powers he had to render them service should always be at their disposal.

Mr. NELSON, in reference to the papers announced to be read at the two next meetings, begged to suggest that it would be very desirable that the Members should have the opportunity of access to the plans and papers connected with the Exhibition of 1851, and also those in connection with the building now in course of erection for the Exhibition of 1862, previous to the meeting at which a paper on the latter subject would be read by Captain Phillpotts. If the Society was in possession of those records, he thought it extremely desirable that Members wishing to see them should have the opportunity of doing so.

The CHAIRMAN said the plans he referred to were in the possession of the Commissioners. He believed that the object of Capt. Phillpotts' paper would be to furnish the members with a clear description of the building; and for the better understanding of the subject, tickets for examining the building itself, on the 30th inst., had been forwarded to all the members.

A specimen of wood-carving by Mr. Perry, and some specimens of coloured Photographs burnt in on glass by Mr. Joubert, were on the table.

The Secretary announced that on Wednesday evening next, the 27th inst., a paper by Mr. Blanchard Jerrold, entitled "Comparison of the Year 1851 with the Year 1861," would be read.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION.

By P. L. SIMMONDS.

NO. X.—THE EASTERN COLONIES.

The Eastern Colonies of Great Britain which will take part in the International Exhibition next year, are Mauritius and its dependencies the Seychelles, Ceylon, and Hong Kong.

MAURITIUS.

This fine island has always taken a very active part in contributing its aid to all competitive displays, whether local or European. In 1851 it made a very creditable show in London. The resources of the island have vastly increased since then. It has increased its population by about one-third, the number being now over 300,000. In 1850 it only exported 55,000 tons of sugar; it now ships 140,000 tons. But Mauritius produces many other products, such as spirits and liqueurs, eau de Cologne, arrowroot, and maize, cotton, coffee, fibrous plants, oils, vanilla, timber, &c. At Paris, in 1855, Mauritius received several medals for its sugar and other products.

Before noticing the efforts making by this colony to take part in the International Exhibition of 1862, it may not be inappropriate to take a retrospective view of the several public exhibitions that have been held at Mauritius. On the 15th October, 1846, the Royal Society of Arts and Sciences of Mauritius, urged by its desire to patronize progress in everything in a colony remote from the centre of learning and civilisation, and to hasten the improvements that might be introduced into its principal agricultural and manufacturing industry, and which were required by the backward state of the cultivation of vegetables, fruits, and flowers, held its first exhibition, with the resolution of rendering it annual. Upon the whole, these exhibitions have from year to year grown more and more important. The products of the great sugar industry of Mauritius are, to say the least, on a par with the most renowned of the kind, and have proved their superiority at the London and Paris Exhibitions. The fruits and vegetables which abundantly supply the market of a town of 50,000 inhabitants, and the crews of upwards of 1,000 vessels, which yearly visit the harbour of Port Louis, bear witness to the remarkable progress made in those useful branches of cultivation. The productions of the different colonial industries, mechanical, artistic, &c., though as yet insufficient to meet the wants of all the world, would do honour to similar industries in the most civilised countries. In a word, the public every year evince a more and more lively interest in these exhibitions, to such a degree as that they have become a real necessity to the colonial community.

At the end of 1858, an invitation from Baron Darricau, the Governor of Reunion (transmitted to the Government of Mauritius, by Mr. Imhans, Deputy of that Colony for France), requested the Society of Arts and Sciences, the Society of Agriculture, and the colonists generally, to contribute to an intercolonial exhibition of the two islands at Reunion. Although taken unawares, many of the Mauritius planters and industrialists made it a point to enter the lists in friendly competition, and a goodly harvest of medals, prizes, and honourable mentions, rewarded them for their praiseworthy efforts.

In 1859 it was the turn of Mauritius to convene her friends and neighbours to one of these peaceful gatherings and competitions of human industry. Being a British Colony, however, the Mauritians considered it their duty to open a wider field of competition, and to invite the other colonies in those seas to join them on the occasion. The

colonists of the Cape and Ceylon received an invitation to forward specimens of their produce, from a comparison of which mutual advantage might be derived. Although small in number, and arriving too late, particularly those from the Cape, to compete with the others, the specimens forwarded served to convince competent judges of the superiority of several of their articles, especially wheat, flour, beer, and alcohols. The annual Exhibition had usually been held in the splendid bazaar of Port Louis, but the preparations for an intercolonial Exhibition required to be made on a larger scale, and to be kept open for a longer period. In the absence of any suitable building the Governor most liberally gave up the whole of Government House, its courts, gardens, and rooms, thus depriving himself, for a length of time, of his official and private residence.

An area of more than 15,000 square feet of rooms, adorned with taste and elegance, was then obtained, besides two or three acres of courts and gardens. The expenses of this Exhibition amounted to £1,368, of which £833 were receipts, £398 contributed by the Government, and £83 by the Society of Arts. The medals distributed cost £398, and the money prizes distributed were £183. Mauritius obtained 51 medals and 10 honourable mentions; Reunion 20 medals and 10 honourable mentions. Of the 250 money prizes, Mauritius obtained 210, of the value of £129, and Reunion 40, of the value of £44. There were 567 Mauritius exhibitors, by whom 1,931 articles were shown, and 55 Reunion exhibitors who sent 350 articles. To these must be added the coffee, vanilla, &c., of Ceylon, and the corn, flour, spirit, beer, &c., of the Cape Colony, forming an aggregate of 2,500 articles exhibited. There were separate classes for sugar, products of the distillery, fine arts, live stock, poultry, vegetables, fruits, roots, corn, grains, and pulse, flowers, medicinal plants, ladies' work, and miscellaneous products. A very valuable report was drawn up subsequently by the Hon. G. C. Fropier, the gentleman who represented Mauritius as delegate at the International Statistical Congress in London last year. The report contained detailed notes on some of the most important articles of colonial produce, and to it and the observations of the committee upon products in general, I am indebted for many of the facts mentioned. Several officials and colonists from Bourbon were present at this intercolonial gathering, among others Commandant Desnozelles, of the Imperial Artillery, chief of the staff of the Governor, selected to accompany the deputation to be present at the inauguration of the statue of the founder of the colony, Mahé De Labourdonnais, which took place, with great pomp, the day before the Exhibition.

At this Exhibition, Governor Stevenson admits that Mauritius was forced to yield the palm to Bourbon in many of the minor objects of cultivation and manufacture, to which no attention whatever had been paid in this colony, but the spirit of the Mauritian planter could boast no conquest in the staple manufacture of sugar, on which so much care and money are expended, and in the superior excellence of which so much pride is justly felt by the manufacturer.

Similar exhibitions are to take place annually at Mauritius and Reunion, alternately, and it is hoped that they will have the effect of improving their mutual manufactures, and of introducing a friendly rivalry in the production and exhibition of fresh objects of utility and importance, while, at the same time, the good feeling which prevails between the two neighbouring islands will be strengthened. Reports were duly made by the "juries" of the exhibition, which were composed of the mixed representatives of Mauritius and Bourbon, and they appear to have been considered fair and equitable as between the two rivals, in their friendly competition for local superiority.

To pass on now to the preparations making for the forthcoming Exhibition in London, I may state that, on the 31st May, Governor Stevenson laid before the Legislative Council circular despatches from His Grace the Duke of Newcastle of the 1st February and 20th April,

respecting the International Exhibition, when a vote of £250 was taken to meet any expenses which might fall upon the Treasury in forwarding objects from Mauritius to the Exhibition. Every publicity has been given in the island to the notices of Her Majesty's Commissioners respecting the Exhibition, by insertion in the Government *Gazette* and in the local press. A Central Committee has been appointed, consisting of the most active and influential persons in the colony, and they have appointed sub-committees in each of the districts to assist them in their labours. The Central Committee has appointed Mr. James Morris to act as agent in London on behalf of the Exhibitors from Mauritius and the Seychelles, and the Governor has approved of the appointment. M. Louis Bouton, Secretary to the Royal Society of Arts and Sciences, Port Louis, acts as Secretary to the Central Committee. The space allotted to, and occupied by, Mauritius in 1851, was about 200 superficial feet, exclusive of passages, and in the French Exhibition of 1855 only 100 square feet could be obtained, and from the large demand for space it is doubtful whether Mauritius will get much more in 1862.

CEYLON.

From no British Colony probably could a more varied and interesting collection of products and manufactures of different kinds be sent than from Ceylon. Its animal and vegetable products are most numerous, and the industry and manufactures of a population of 2,000,000 will be studied with curiosity and advantage. A very good collection of Ceylon products was shown in 1851. A committee was also appointed by the Governor, Sir George Anderson, under the instructions of the Secretary of State for the Colonies, for the purpose of securing a due representation of the industry and resources of the island at the Paris Universal Exhibition of 1855. A collection of its natural and manufactured products, formed partly from private contributions, and partly paid for with the funds voted by the Legislature, and as complete as the limited time allowed for its preparation would permit, was forwarded to England in December, 1854, and exhibited at Paris.

It comprised an interesting collection of the principal timbers of the island from Mr. Layard, among which was one tamarind plank, of extraordinary size, and three planks, and wood from the root, of the scarce and beautiful calamander tree, so valuable for furniture and ornamental purposes, a numerous collection of fibrous substances and barks, gums and resins, oils and indigo, grains and pulse, and staple articles of export, besides manufactured articles. The tamarind wood furniture, the calamander and ebony cabinets, couches, &c., the flowered satin wood, and the inlaid woods were most elegant. Articles from the animal and vegetable kingdom, models of boats, implements, native fruits, figures illustrating the native castes, and mineral substances, completed the list. A great number of the vegetable products shown were transferred, by gift or purchase, to the museum of the Royal Gardens, Kew.

In May last, with the view to giving the utmost publicity to the intentions of the promoters of the Exhibition, the Governor caused to be published the despatch from the Secretary for the Colonies, and its inclosures, in the Ceylon Government *Gazette*. His Excellency also appointed a Committee of 18 gentlemen, representing every section of the community, for the purpose of furthering the objects contemplated, and also gave instructions to the government agents of the several provinces to render every assistance in their power to the Committee. On the application of the Committee, Sir Charles Macarthy sanctioned the advance of £1,000 from the Colonial Treasury, to enable them to procure articles illustrative of the industry and produce of the island. At their suggestion, he also approved of the appointment of sub-committees at different out-stations, where they might be required to co-operate with the General Committee in furthering the objects contemplated. Mr. Edward Rawdon Power, late of the Ceylon Civil Service, is appointed commissioner to act

for the colony in London, and Messrs. John Capper and P. Grimblot, are the secretaries of the Committee in Ceylon. An area of 500 square feet net space has been allotted by Dr. Lindley, the Colonial Superintendent, to Ceylon.

The Governor was very anxious to send home, for erection in the transept or other lofty prominent place, a Talipot palm (*Corypha umbraculifera*) in flower, which is a rare and beautiful object, and has perhaps never been seen in Europe. The tree would probably stand 60 feet high, and was to have been sent home in lengths of about 12 feet, the top and flowers being packed separately. Difficulties, however, stood in the way of this being admitted, as, however curious and ornamental, it did not represent any industry.

HONG-KONG.

In June last, Sir Hercules Robinson, the Governor, appointed the following gentlemen a Local Committee to consider the representation of the colony at the International Exhibition:—Mr. Mercer, Colonial Secretary, Chairman; Mr. J. J. Mackenzie, of Messrs. Dent and Co.; Mr. J. D. Gibb, of Messrs. Gibb, Livingstone, and Co.; Mr. Walkinshaw, of Messrs. Turner and Co.; and Dr. Kane. His Excellency has also nominated Mr. Patrick Campbell, of the Oriental Bank Corporation, as agent for the Colony in London.

The *Official Gazette* of the 27th July, published a document issued by the Local Committee, which stated that all articles must be forwarded through them, as the central authority; and that Admiral Sir James Hope had expressed his readiness to let such things as might be ready in time to go by the long sea route be carried in any of the ships proceeding to England at suitable dates. The remainder of the goods the Committee purpose sending by overland passage.

As a rough suggestion of what may be contributed, the Committee have put forward the following list:—

1. *Articles for use*.—Paper, matting, minerals, such as granite, coal, steatite, jade-stone, gypsum, lapis-lazuli, &c., vegetable and insect wax. 2. *Food*.—Dried fish, tobacco, native opium, tea, sugar, samshu or Chinese wines, grain and pulse of all kinds, soy, and ginger. 3. *Ornament*.—Silk screens (embroidered), fans, gold-work, silver-work, ivory-work, bamboo carved-work, peachstone-work, pottery and porcelain, bronzes, enamels, crystals, lacquered ware. 4. *Dress*.—Silk, raw and manufactured; Chinese hats of different grades or distinction, mat-cloaks, manufactured cotton, wools, grass-cloth and crapes. 5. *Medicines*.—Chinese herbal, and others. 6. Musical instruments and gongs.

Mr. Medhurst has also issued a circular, at the request of the Chairman of the Hong-Kong Committee, notifying to the foreign community, that in the event of no local committee being established for representing the port of Shanghai, the Hong-Kong Commission will be glad to render every assistance to intending exhibitors, as the contributions from Hong-Kong will consist mainly of Chinese material.

There are no advices from the small settlement of Labuan indicating any intention to contribute specimens of its coal or other articles of Eastern produce for the Exhibition.

Proceedings of Institutions.

MARYLEBONE LITERARY AND SCIENTIFIC INSTITUTION.—The half-yearly meeting of members was held on Tuesday, November 12th, when a most satisfactory report was presented by the committee. During the preceding half-year, although a period least favourable to Institutions generally, the liabilities have been considerably reduced, and the balance is more than covered by the property of the Society. The best signs of improved vitality were, however, the speedy influx of members during the past two months, and the increased attendance

at the lectures and classes. Among the alterations determined upon, was the giving a life membership to the first member who should obtain a first-class prize from the Society of Arts, the annual gift of a life membership to the successful prize essayist on some subject to be selected by the committee; and the establishment of classes for ladies. Altogether the meeting was a cheering one, and all present seemed satisfied that the only further effort necessary to again place this old established and useful institution on a sound basis, was that each member and friend should forthwith obtain one new member, and thus constitute a body sufficiently numerous to represent the intelligence of so important and wealthy a locality as that of Marylebone and its suburbs.

MEETINGS FOR THE ENSUING WEEK.

- MON. ...Geographical, 8½.
Medical, 8½. Dr. F. W. Mackenzie, Lecture 2. "Physiological Researches into the Origin of Phlebitis as connected with the Pathology of Phlegmasia Dolens."
TUES. ...Civil Engineers, 8. 1. Mr. W. Bray, M. Inst. C.E., "On Measuring Distances by the Telescope." 2. Mr. Edward L. J. Blyth, M. Inst. C.E., "Description of the Loch Ken Viaduct on the Portpatrick Railway."
R. Medical and Chirurgical, 8½.
Zoological, 9.
WED. ...Society of Arts, 8. Mr. Blanchard Jerrold, "Comparison of the Year 1851 with the Year 1861."
R. Society of Literature, 8½.
THURS. ...Philological, 8.
Antiquaries, 8½.
SAT.Royal, 3½.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, November 15th, 1861.]

Dated 26th September, 1861.

2407. J. Tessier, 48, Rue St. Nicholas d'Antin, Paris—Improved means of treating barley, corn, and other cereals, for brewing and other purposes.
Dated 2nd October, 1861.
2455. J. Davis, and T. Evans, Ulverston, Lancashire—Imp. in the construction of engines to be worked by steam, air, or gases.
Dated 5th October, 1861.
2488. J. Edwards, 77, Aldermanbury—Imp. in the manufacture of buttons.
2496. T. Hughes, Birmingham—An improved high pressure tap for regulating and controlling the flow of steam, water, and other fluids.
Dated 9th October, 1861.
2516. W. Smith, 21, King-street, West Smithfield—Imp. in apparatus for measuring and regulating the pressure of gas.
2518. J. Walker, Carrickfergus, Ireland—An improved chimney top, cap, or cowl for the prevention of the descent of sooty exhalations, curing of smoky chimneys, and ventilation of apartments.
Dated 10th October, 1861.
2536. W. E. Newton, 66, Chancery-lane—An improved apparatus for heating the feed water of steam engines. (A com.)
Dated 16th October, 1861.
2574. T. Forster, Sparrow-hall, Streatham, Surrey—Imp. in reworking waste vulcanised india-rubber.
Dated 17th October, 1861.
2585. R. Smith, 24, Higher Chatham-street, Chorlton-upon-Medlock, and J. B. Rowcliffe, Manchester—Imp. in apparatus for winding yarn or threads on the pin-bobbins or spools used in small-ware and ribbon looms.
Dated 18th October, 1861.
2602. B. Taylor, Birmingham—An imp. or imp. in the manufacture of certain descriptions of brace webs, known as india-rubber webs.
Dated 17th October, 1861.
2608. W. G. C. Hudson, 25, Milk-street, Cheapside—An improved portable apparatus for copying letters and other written papers or documents.
2612. J. Cooper, Hightown, near Leeds—Imp. in carding engines for the carding of cotton, silk, wool, and other fibrous substances.
2614. J. Bourne, Oakamoor, Staffordshire, and E. Kidd, Birmingham—Improved machinery for the manufacture of metal tubes and cylinders, which is also applicable to other useful purposes.
Dated 25th October, 1861.
2668. W. Wharton, Birmingham—Imp. in the manufacture or construction of springs for railway or other vehicles.
2670. C. N. May, Devizes—Imp. in garden pots.

2672. S. Oppenheim, 4, South-street, Finsbury—Imp. in the manufacture of printed shirt fronts.
2674. E. Alexandre, 4, South-street, Finsbury—An improved pedal box to be applied to flutinas, or small organs, and other similar musical instruments.
2678. H. Gilson, Festiniog, North Wales—Imp. in slate dressing machines for cutting and trimming the edges of slates.
2680. B. J. LaMothe, New York—Imp. in the construction of metallic railroad cars and other vehicles.

Dated 26th October, 1861.

2684. W. Robertson and J. M. Hetherington, Manchester—Certain imp. in mules for spinning and doubling.
2687. F. Wrigley, Manchester—Imp. in the construction of railway wheels and wheel tyres.
2688. S. H. Parkes, Birmingham—Imp. in watch keys.
2690. R. B. Greenwood, 5, Durham-place-east, Hackney-road—An improved billiard rest.
2692. C. Stevens, 31, Charing-cross—Improved apparatuses for indicating escapes of lighting gas from the conveying pipes, and determining the precise leaking places of the said pipes. (A com.)

Dated 28th October, 1861.

2696. B. Predavalle, 143, Fleet-street—A new mode of and apparatus for producing and obtaining an hydro-pneumatic motive power.
2698. W. Ryder and T. Ryder, Bolton-le-Moors—Imp. in machinery for fluting rollers.
2700. G. M. Gilbert, 1, Albany-terrace, Britannia-square, Worcester—Imp. in preparing blue colour, and in apparatus for applying such colour to water.

Dated 29th October, 1861.

2704. J. Martin, Liverpool—Imp. in granaries, and the apparatus connected therewith.
2706. J. Bibbington, Rochdale—Imp. in machinery for breaking and crushing limestone and other hard substances.
2708. W. H. Furlonge, Mark-lane—Imp. in the condensation of steam by surface contact.
2712. J. S. Jackson, Pendleton, Lancashire—Imp. in the treatment of woven fabrics known as cords.
2716. J. M. Johnson, 47, Lincoln's inn-fields—Imp. in the preparation or treatment of skins and hides. (A com.)

Dated 30th October, 1861.

2718. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved composition for igniting lucifer matches. (A com.)
2720. E. Leigh, Manchester—Imp. in the construction of sailing ships and other vessels.
2722. W. Cowper, Oldham, Lancaster—Imp. in machinery for cutting or dividing wood into scantling or laths.
2723. R. W. Winfield, Birmingham—An imp. or imps. in the manufacture of pulley rods for curtains, commonly called "French pulley rods."
2724. R. W. Winfield, Birmingham—An imp. or imps. in ornamenting metallic bedsteads, and other articles of metallic furniture.
2728. A. Topham, J. Topham, and J. Topham, St. Pierre les Calais, France—Imp. the manufacture of lace.
2730. E. Watson, King-street—An improved fastening for buttons, studs, solitaires, brooches, civil and military decorations, and other like articles.

Dated 31st October, 1861.

2731. Lieut. B. H. Mathew, R.E., Saint James's—Imp. in fire-arms, and in cartridges.
2732. J. A. Fanshawe and J. A. Jaques, Tottenham—Imp. in the construction of steam generators.
2733. G. Norman, St. Matthias-place, Stoke Newington-green—Imp. in the mounting of cots or cradles.

Dated 1st November, 1861.

2738. W. J. Williams, Warnford-court—An improved process for correctly transmitting the effect of the main levers in platform scales to the steelyard or weighing beam of platform scales. (A com.)
2739. W. J. Clark, 53, Chancery-lane—Imp. in photograph albums. (A com.)
2741. T. B. Whitehead, Collyhurst-road, Manchester—Imp. in steam boilers, applicable also to other vessels or chambers containing steam.
2742. J. Higgins and T. S. Whitworth, Salford—Imp. in machinery or apparatus for preparing cotton and other fibrous materials for spinning.
2744. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of cast steel or of homogeneous iron.
2745. M. Myers, M. Myers, and W. Hill, Birmingham—Certain imp. in metallic clips or points for holding, connecting, and adjusting crinolines and other like purposes.
2747. R. R. Priestly, Glasgow—Imp. in the production of cotton, worsted, or composite yarns.
2748. A. Smith, Mauchline, Ayr, N.B.—An improved combined book marker and paper cutter.
2749. M. Henry, 84, Fleet-street—Imp. in steam engines and boilers.

Dated 2nd November, 1861.

2751. W. Worsley, Hovingham, Yorkshire—A self-acting railway signal.
2753. A. F. Yarrow Arundel-square, Barabury, and J. Hilditch, Barnsbury-villas—Imp. in machinery used when ploughing, tilling, or cultivating land by steam-power.
2754. J. C. Wilson, 25, Bucklersbury—Imp. in machinery or apparatus for the manufacture of sugar.

2755. T. Walker, 18, Robert-terrace, King's-road, Chelsea—Certain imp. in the construction of cables or chains for telegraphic and other purposes, and for machinery connected therewith.
2757. J. French, Manchester-road, Bradford—Imp. in machinery or apparatus for doubling or twisting yarns of worsted or other fibrous substances.

2758. B. Brown and R. Hacking, Bury—Imp. in machinery for preparing cotton to be spun, known as openers, scutchers, and carding engines.

2759. S. Osborne, Bayswater—Imp. in hooped skirts.

2760. T. Lockie, Glasgow—Imp. in the manufacture of wrought-iron wheels.

2761. G. Evans, 69, Gloucester-terrace, Portman-square—Imp. in treating peat to render it useful as fuel and for illuminating and metallurgical purposes.

2762. S. W. Worsam, King's-road, Chelsea—Imp. in machinery for cutting wood.

Dated 4th November, 1861.

2764. J. Bowden, Salford—Certain imp. in dyeing and in apparatus employed in dyeing.

2766. J. Archer, Birmingham—Imp. in certain kinds of weighing machines, balances and scale beams.

2768. A. G. Horton, Sheffield—An improved construction of skate.

INVENTIONS WITH COMPLETE SPECIFICATION FILED.

2808. J. H. Johnson, 27, Lincoln's-Inn-fields—Imp. in the treatment of carpets. (A com.)—8th November, 1861.

2817. J. Fisher, Carrington, near Nottingham—Imp. in apparatus for indicating or regulating the passing of railway trains.—9th November, 1861.

PATENTS SEALED.

[From Gazette, November 15th, 1861.]

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| <i>November 15th.</i> | 1280. W. C. Forster. |
| 1271. S. L. Sotheby. | 1286. G. E. Donisthorpe. |
| 1275. J. Hughes. | 1289. E. Humphreys. |
| 1277. R. King and K. Robson. | 1294. Y. Parfrey. |

[From Gazette, November 19th, 1861.]

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| <i>November 19th.</i> | 1326. W. Smith, J. Lord, and H. Barlow. |
| 1283. J. Jobin and J. Weber. | 1329. C. S. Duncan. |
| 1291. M. A. F. Mennons. | 1330. Lord A. S. Churchill and E. W. H. Scheneley. |
| 1295. T. Aveling and H. Rawlinson. | 1331. J. Leo and B. D. Taplin. |
| 1298. J. Bleasdale. | 1332. W. B. Holbech. |
| 1301. H. B. De Beaumont. | 1375. P. Gondolo. |
| 1302. G. E. Donisthorpe. | 1434. S. C. Lister and J. Warburton. |
| 1303. G. B. Naglost. | 1502. W. E. Gedge. |
| 1305. L. Lumb and W. H. Buterworth. | 1560. W. Fleming. |
| 1306. C. Nuttall. | 1603. J. H. Johnson. |
| 1308. W. Tebbutt. | 1722. W. Pask. |
| 1311. R. A. Brooman. | 1726. A. Noble. |
| 1312. E. Partridge. | 1761. P. J. De Rette. |
| 1313. H. M. F. J. Vicomte de la Tour-du-Breuil and A. M. A. de la Tour-du-Breuil. | 1922. W. E. Newton. |
| 1319. J. Paterson. | 1960. W. H. Richards. |
| 1320. R. Pierce. | 2386. G. Davies. |
| | 2395. A. V. Newton. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID, AND DATES OF THEIR PRODUCTION FOR CERTIFICATE.

[From Gazette, November 15th, 1861.]

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| <i>November 11th.</i> | 2630. T. S. Cressey. |
| 2606. J. M. Miller and J. Fear. | 2838. W. Beardmore. |
| <i>November 12th.</i> | |
| 2540. J. G. Martien. | <i>November 13th.</i> |
| 2553. M. L. J. Lavater. | 2556. D. Frodsham. |
| 2560. T. R. Butcher, F. Stevens, W. T. Johnson, and T. Jarvis. | |

[From Gazette, November 19th, 1861.]

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| <i>November 14th.</i> | 2604. J. Leslie. |
| 2667. R. H. Hess. | 2625. W. Marshall. |
| <i>November 15th.</i> | 2649. F. A. Theroude. |
| 2572. A. I. H. Parent. | 2692. W. Richards. |
| 2575. C. J. C. Perry. | 2831. B. Louth. |
| 2581. M. A. Muir and J. McIlwham. | <i>November 16th.</i> |
| 2590. M. Caton. | 2672. F. C. Calvert. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID, AND DATE OF THEIR PRODUCTION FOR CERTIFICATE.

[From Gazette, November 15th, 1861.]

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| <i>November 13th.</i> | |
| 2402. J. Armstrong. | |
| <i>November 19th, 1861.</i> | |
| 2481. S. A. Carpenter. | |

Journal of the Society of Arts.

FRIDAY, NOVEMBER 29, 1861.

INTERNATIONAL EXHIBITION OF
1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £439,450, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

There is nothing in the way of novelty to be chronicled in the progress of the building this week. All those portions of the work which were in hand at the date of the last notice in the *Journal* are being pushed forward with great rapidity, and yet the advance does not appear, at first sight, to be so great as when there were only a few columns erected on the ground.

The domes, of course, still form the most attractive feature of the works, so much so that numbers of spectators are always standing in the Prince Albert's and Exhibition roads watching with eager interest the hoisting and fixing of the ties and girders. The cross ribs, which are to form the support of the eastern dome, are fixed on three sides, namely, over the nave, over the south-eastern transept, and over the eastern entrance. Those at the end of the north-eastern transept are also in course of erection. The timber framework on the western side of this dome is in its place as high as the spring of the ribs. The columns of the western dome are rising fast, six being up to the required height, and the ribs over the western entrance in Prince Albert's-road have been begun.

The galleries all round the courts are now roofed in, and the workmen are preparing to cover them with felt and to lay the gutters. The roof over the southern courts extends over the whole of the south-eastern and south-central courts, and a portion of it, which is over the former, is being glazed. The corresponding roof on the north side of the nave is also in course of erection. Since last week great progress has been made in roofing the northern transepts, eight ribs of the one on the west being erected, and seven of the one on the east. The glaziers are at work on the windows of the clerestory of

the south-western transept, and the windows themselves are being put up in the corresponding transept on the west.

The iron coping, which forms the gutter of the large picture gallery, has been fixed on the northern or inner front, and this side of the roof is being slated. The slating of the outer front has been completed throughout the length of the building, so that the gallery along the Cromwell-road may now be considered as nearly finished externally. Inside, both the long galleries are floored; the walls of the one on the east of the entrance are also boarded, and the plasterers have commenced the cornice. There can now be no doubt of this magnificent hall being admirably suited for the exhibition of pictures. The proportions strike the visitor immediately as noble; the light falls in such a way as to be equally distributed over the whole gallery, and the walls are high enough to admit of the display of large cartoons, or the equally extensive pictures of the French school. The smaller picture galleries along the Exhibition road are being roofed in, the principals having been erected nearly throughout, and a portion of the top light fixed.

In allotting space in the Exhibition, and fixing the position which different classes of manufactures shall occupy, it will be necessary to distinguish carefully between the necessities of each as regards light. The building is so constructed that any medium may be obtained between the broad glare of day in the glass courts to comparative obscurity under the galleries along the transepts. At the same time it is evident that while manufactures, such as pottery, glass, and goldsmith's work require all the light they can obtain, carriages, building materials, and similar objects, are seen to greater advantage in a more subdued light.

The great cry among exhibitors is still for more space. Letters are received continually, complaining of the small allowance, especially to the large manufacturing towns, and even threats are held out of a refusal to exhibit unless the demands are complied with. It is of the greatest importance that applicants should understand precisely the position of Her Majesty's Commissioners. The space available for exhibition is strictly limited, and every foot at their disposal has been allotted. It follows that any increase in allotment, either individually or in class, must be made at the expense of some other exhibitor or some other industry. Under these circumstances it is imperative that all claims for space should be rigorously investigated. The remedy in every case lies with the Committees; by allotting their space proportionally to the merits of the applicant, and not in proportion to his claim, they may hope to place our manufactures in the Exhibition on that foot-

ing of superiority to those of foreign countries which they have always maintained.

The following additional arrangements have been made :—

URUGUAY.

Graham Gilmour, Esq., of Glasgow, Vice-Consul of the Republic of Uruguay, will represent the interests of that Republic at the coming Exhibition.

TUNIS.

A communication has been received notifying the appointment of Mr. Moses Levy, of 59, Fenchurch-street, as agent for the Tunis Commissioners.

SECOND ORDINARY MEETING.

WEDNESDAY, NOV. 27TH, 1861.

The Second Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 27th inst., John Dillon, Esq., Vice-President of the Society, in the chair.

The following candidates were proposed for election as members of the Society :—

Ames, Henry St. Vincent, {	Cote Ho. Westbury-on-Teym,
M.A.	near Bristol.
Ayerst, Francis	24, Bessborough-gards., S.W.
Benson, Robert	Oxford-street.
Blake, Henry, Woolaston {	8, Devonshire-place, Maryle-
F.R.S.	bone, W.
Brierley, Henry	8, Surrey-st., Strand, W.C.
Buchan, Jno. Hitchcock... {	The Grove, Hanwell, Mid-
Cator, Geo. Albemarle ...	dlesex.
Carbutt, Geo. Henry.....	Selby, Yorkshire.
	Liverpool.
Clark, Alexander	Tower-house, Highbury New-
	park, N., and 15, Gate-st.,
	Lincoln's-inn-fields, W.
Cleugh, Alexander	Imperial Mills, Bromley, E.
Dadley, John	Birmingham.
Douglas, Charles C.	Dale-street, Liverpool.
Douglas, William	High-st., Exchange, Liverpool.
Edwards, Thos. Dyer ... {	5, Hyde-park-gate, Kensing-
	ton-gore, W.
Ethelston, Rev. Charles {	
Wicksted, M.A.	Rectory, Uplyme, Devon.
Goschen, George Joachim	Eltham, Kent.
Halse, William	12, Love-lane, Aldermanbury,
	E.C.
Hampton, Thos. Inglis... {	20, King-st., St. James's, S.W.
Harris, Frederick Wm....	Coal Exchange, E.C.
Hellman, Christian	Club Chamb., Regent-st., S.W.
Hook, John	66, New Bond-street, W.
Jackson, Frederick	Nottingham.
Lyle, J. G.	20, Little Moorfields, E.C.
Makin, Edwin John.....	Attercliffe, Sheffield.
Martin, Henry	Westwood - villa, Highbury
	New-park, N.
Michael, Michael Henry	20, The Cedars, Putney, S.W.
Oldershaw, Captain R. {	74, Warwick-sq., Belgravia,
Piggott	S.W.
Pickering, John P.	40, Little Moorfields, E.C.
Schwartz, Henry Wm. ...	Liverpool
Sears, Henry Beaufort ... {	(Messrs. Carstairs and Co.),
	Liverpool
Sharp, Wm.	Edward-court, Handsworth,
	near Birmingham.
Stapleton, Thos. Werney. {	Marne-cottage, Roehampton,
	Surrey.

Stephens, Chas.	Earley-court, near Reading
Tidswell, Edward	1, Friday-street, E.C.
Watson, Geo.	2, Charles-st. Grosvenor-sq. W.
Wertheimer, Sampson ...	154, New Bond-street, W.
Wood, Geo. Watson	24, Gloucester-street, Bel-
	gravia South, S.W.

AND AS HONORARY CORRESPONDING MEMBER.

Vogt, G.	Berne, Switzerland
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The following Institution has been taken into Union since the last announcement :—

Kenilworth Institute.

The Secretary stated that Mr. Blanchard Jerrold had been prevented at the last moment by illness from reading the paper announced for this evening, and that Mr. P. L. Simmonds had kindly undertaken to prepare a paper at very short notice.

The Paper read was—

ON THE FOREIGN DEPARTMENT OF THE INTERNATIONAL EXHIBITION OF 1862.

By PETER LUND SIMMONDS.

I have to claim some indulgence from the members owing to having been pressed into service at a very short notice, with a request that I would give some information as to the Foreign countries that intend to take part in the International Exhibition next year. Now, I believe it is known to many present that I have long paid attention to Colonial matters, but the Foreign portfolio is a little out of my department. However, as in ministerial changes an official is often transferred from one post to another widely different, and is obliged, by the force of circumstances, to make himself acquainted very promptly with the details and proceedings—present, past, and future—which appertain thereto, so I have had to master the subject which has been pressed upon my notice for discussion. Though I fear I can give you very little beyond a *resumé* of much that is generally known to the public—as to the intentions of foreign exhibiting countries, yet I may be able to add some commercial and statistical details, which will serve to bring out the importance of our cultivating closer relations with Foreign Countries, in order that the course of our trade with them may be extended in a ratio somewhat commensurate with the great strides our Colonial trade has made in the last few years.

If we look at the commercial progress and manufacturing results of the past ten years, some degree of merit may fairly be attributed to the extension of that principle of competitive display which was so creditably inaugurated in this metropolis in 1851, and to which the Society of Arts so largely contributed. National exhibitions of art and manufacture had previously been held. France, Germany, and many other countries had gathered together, from time to time, the best works of their art and industry. But the world at large had never before been invited to compete, or to come and inspect for themselves the finest specimens of every kind of produce and manufacture. The germ of many a useful invention, which has since been matured, was then developed. The citizens of many countries there saw *chefs-d'œuvre* of art, and works of skill and mechanism, of which they were not before aware. Objects of comfort, of necessity, and luxury, ingenious models and skilled contrivances, led to others, or it may be, in some cases, to imitations and improvements.

Since then there have been exhibitions on a larger or smaller scale at New York, Munich, Paris, Brussels, Rome, Florence, and in many of the French departmental towns.

The official and jury reports on the London, New York, and Paris International Exhibitions, by eminent men, have been exceedingly valuable.

The extension of the principle of industrial exhibitions, even on a small scale, to Foreign countries and to our own Colonies, has been attended with many advantages, in promoting improved cultivation, manufactures, chemical and scientific researches, and art education.

To Great Britain, the International Exhibition of 1851 certainly opened a wider range of customers from the more intimate appreciation that followed of the quality and cheapness of the manufactures she produces. Instead of being flooded, as was anticipated, with cheap foreign goods, a greater vent for British manufactures has been afforded in the last ten years than in any former period. In every direction our foreign trade has more than doubled. To South America our exports have risen from £6,000,000 in value to 12½ millions; to China, from under one million to nearly three; to African States, in about the same ratio; to the North American Republic, from under 15 millions to £21,613,000; to the States of Europe, from £25,200,000 to £46,000,000. And as regards the Continent, and, indeed, most other quarters, it is those very nations which took a most active part in the Great Exhibition of 1851, that show the greatest increase, and have become our best customers, such as France, Prussia, Russia, Holland, Germany, and Turkey. Our general trade has doubled. The real value of the external trade of the kingdom (imports and exports) last year reached the large sum of £376,319,296, of which £210,648,643 was for imports. The extension of commercial relations with various countries, and a more thorough knowledge of our productive resources, and the quality of our manufactures, by foreigners, has had much to do with this increase. And, certainly, the British exhibitors will, I think, be able to show next year that there has been no retrogression; that science and skill have been largely developed, and that even the art education of our workmen has not been neglected, thanks to the labours of the Department of Science and Art.

The declared value of our exports to the foreign countries which took part in the Exhibition of 1851 was, for 1850, £47,081,205. The value of the imports was not computed at that time, and it is therefore impossible to give it. The real value of our aggregate trade last year (imports and exports), carried on with the countries which have announced their intention of being represented at the International Exhibition of 1862, was £287,000,000.

The total declared value of our exports to foreign countries in 1850 was £52,739,246, and in 1860, £117,988,399. Although it cannot be assumed that this immense progress is entirely attributable to the better appreciation of our wares by Foreign countries, and the new markets opened up to our manufactures by the Great Exhibition of 1851, yet I think it will not be denied that great benefits resulted from the interchange of ideas in 1851. Our friendly relations with many of the nations of Europe have been more closely cemented. In Hyde-park and in the Champs Elysées we demonstrated what we could do in the way of excellence and cheapness. Enterprise has been stimulated—Commerce extended; our principal manufactures have enormously increased; steam and sail have carried the products of our industry into regions before unopened to trade.

These, and many other points, were so well put by Mr. Hawes in his paper on the Exhibition, at the close of last session, and by the Chairman in his opening address at the last meeting, that I need not dwell further on them.

I have drawn up, for the information of the members, two tables, showing all the Foreign countries that took part in the Exhibition of 1851, and all those that intend to be represented next year; and the comparison will be found interesting, as marking the progress of interest manifested, the remarkable advances of many of these countries, and also the political changes which have taken place in some of these States.

STATES REPRESENTED AT THE GREAT EXHIBITION IN 1851.

	Space occupied. Feet.	Declared Value of Exports of British and Irish Produce and Manufactures in 1850.	No. of Exhibi- tors.
EUROPE—AUSTRIA.. <i>Empire.</i>	13,946	607,755	750
ZOLLVEREIN STATES.			
Prussia <i>Kingdom.</i>	14,755	424,480	897
Bavaria "	1,074	...	102
Saxony "	4,253	...	188
Wurtemberg "	1,735	...	110
Baden <i>Grand Duchy.</i>	...	...	...
Hesse "	832	...	86
Saxe Weimar ... .. "	...	...	...
Luxembourg... .. "	26	...	6
Hesse <i>Electorate.</i>	...	...	229
Brunswick <i>Duchy.</i>	...	...	...
Nassau "	107	...	13
Saxe Altenbourg ... .. "	...	...	...
Saxe Meiningen ... .. "	...	...	...
Saxe Cobourg ... .. "	...	...	...
Saxe Gotha ... .. "	...	...	...
Anhalt Dessau ... .. "	...	...	...
Anhalt Koethen ... .. "	...	...	...
Anhalt Bernbourg ... .. "	...	...	7
Frankfort <i>City.</i>	248	...	33
Reuss <i>Principality.</i>	...	...	...
Lippe-Beisterfeld ... .. "	...	...	5
Schwarzburg-Rudolstadt ... .. "	...	...	...
Schwarzburg - Sonderhausen ... .. "	...	...	...
NORTH GERMANY "	1,625	...	...
Hanover <i>Kingdom.</i>	...	231,987	10
Mecklenburg Schwe- rin <i>Grand Duchy.</i>	...	33,898	10
Mecklenburg Strelitz ... .. "	...	...	4
Oldenburg "	...	11,436	3
HANSE TOWNS—Hamburg } Lubeck "	...	6,755,545	{ 123
Netherlands <i>Kingdom.</i>	1,183	3,542,632	114
Belgium "	...	1,136,237	512
France <i>Republic.</i>	...	2,401,956	1,740
Algeria "	...	15,069	72
Switzerland "	3,405	...	278
Papal States "	277	222,559	57
Tuscany <i>Grand Duchy.</i>	1,208	769,409	128
Sardinia <i>Kingdom.</i>	1,070	774,512	97
Portugal "	927	1,076,811	272
Madeira... .. "	...	41,578	2
Spain "	1,055	926,751	300
Sweden "	...	151,030	...
Norway "	612	211,917	{ 117
Denmark "	268	454,304	53
Russia <i>Empire.</i>	5,490	1,454,771	388
Turkey "	2,063	3,113,679	1
Greece <i>Kingdom.</i>	359	202,228	62
AFRICA—Egypt. <i>Vice-royalty.</i>	460	648,801	1
Tunis <i>Dependency.</i>	1,498	5,128	1
West Coast of Africa "	...	641,975	...
ASIA—China (and Hong-Kong) ... <i>Empire.</i>	2,375	1,574,145	40
Persia <i>Kingdom.</i>	186	...	10
POLYNESIA. Soc. Islands. <i>Kingdom.</i>	...	...	2
AMERICA—St. Domingo <i>Repub.</i>	...	274,918	1
Brazil <i>Empire.</i>	...	2,544,837	4
Bolivia <i>Republic.</i>	...	...	1
Chile "	180	1,156,266	1
New Granada "	...	330,810	5
Mexico "	...	451,820	1
United States "	12,864	14,891,961	634
		47,081,205	11

In the preceding table I have been able to add, from the official returns, the space occupied and the number of exhibitors.

In 1851 there were 6,556 Foreign exhibitors in the thirty classes, who occupied 131,655 feet of horizontal, and 222,832 feet of vertical space, against 7,381 British exhibitors, occupying 207,059 horizontal, and 430,311 vertical feet of space.

Large as the Exhibition building is, on the present occasion, it is quite inadequate to the wants of intending exhibitors. The United Kingdom and the British Colonies could alone have filled it creditably—especially when we remember how important are our own home industries—textile, metallic, mining, engineering, &c.; and when we look at the surprising advance of our various Colonies, and the active exertions they are all making to be creditably represented, as I have of late had frequent occasion to show in the pages of the *Society's Journal*.

Although we have liberally given up a clear half of the building to Foreign countries, and the Commissioners have endeavoured to mete out the available space as fairly as possible among the numerous applicants, the cry is still, "Give—give;" and they are all, like *Oliver Twist*, asking for more.

The Foreign countries that took part in the Exhibition of 1851 were:—5 empires, 15 kingdoms, 6 principalities and vice-royalties, 8 grand duchies, 9 duchies, 8 republics, 3 free cities, and 1 electorate.

In 1862 the Foreign countries which will be represented in the competitive display will comprise 8 empires, 12 kingdoms, 18 republics, 1 vice-royalty, 1 pontificate, a number of duchies, principalities, and petty states, and 3 free towns.

The first column of the following Table includes the population of its colonies, where the country has any. The second column gives the computed real value of the total imports of merchandise from each Foreign country to the United Kingdom last year. The third column shows the real value of the exports of British and Foreign and Colonial produce to each country named and its Colonies in 1860 (see next page).

There are two other statistical tables which I would submit to the consideration of the meeting, as bearing specially upon the subject under review, these show the course of our Shipping trade with the various Foreign Countries in 1850 and 1860, as evidenced by the entries and clearances of Foreign ships. From these figures it will be seen that while the total tonnage engaged in the Foreign trade with the United Kingdom has doubled in the ten years, Foreign shipping has obtained the largest share of the carrying trade, the aggregate tonnage (entries and clearances), in round numbers, having advanced as follows:—British shipping, from 8,000,000 to 14,000,000; foreign shipping, from 4,000,000 to 10,775,000.

Turning first to the Continent of Europe, notwithstanding wars and the many alterations in the boundaries of States, there has been great industrial progress in the last ten years, and many important concessions have been made to the freedom of commerce. Our commercial relations with France are becoming year by year more extended. The *Steuerverein* League has been broken up, and many new States have given in their adhesion to the Germanic Confederation of the *Zollverein*. The marriage of the Princess Royal to the Crown Prince of Prussia has drawn us into closer connection with Prussia, the chief nation of that Customs' Union. The long struggle for Italian independence has terminated favourably, and the banner of war is replaced by the pennon of peace, and a return to peaceful industries, as evidenced by the recent successful Italian Exhibition. Serfdom has been abolished in Russia, and a more rapid advance in the industrial resources of that great empire may be looked for.

Notwithstanding some interruptions and drawbacks, during the period that has elapsed since the last Exhibition, British commerce has steadily progressed, and widely extended its range of operations. We have

INTERNATIONAL EXHIBITION, 1862.
ALPHABETICAL LIST OF FOREIGN COUNTRIES TO WHICH
SPACE HAS BEEN ALLOTTED.

COUNTRY.	Population.	Value of Imports from in 1860.	Value of Exports to in 1860.
Arabia Kingdom.	...	...	...
Belgium Kingdom.	4,671,187	4,070,866	3,964,670
CENTRAL AMERICA:—			
Mexico Republic.	8,137,853	490,221	538,949
Costa Rica "	135,000	...	...
Guatemala "	850,000	...	...
Honduras "	350,000	224,909	196,091
Salvador "	600,000	...	...
China Empire.	415,000,000	9,323,764	2,915,542
Denmark Kingdom.	2,752,500	2,642,877	1,594,050
Egypt Viceroyalty.	5,125,000	10,352,574	2,598,912
Feejee Islands ... .. "	...	...	...
France and Algeria Empire.	39,500,000	17,895,210	15,759,258
GERMANY:—			
Austria "	35,000,000	986,349	1,488,098
Northern Germany* "	1,100,000	7,524,016	13,850,705
Zollverein† "	33,543,000	7,920,511	4,846,283
Greece Kingdom.	1,100,000	677,342	374,211
Holland (and Colonies) "	18,200,000	8,713,952	10,247,151
Italy "	21,729,000	2,748,525	5,277,720
Japan Empire.	50,000,000	167,511	...
Liberia Republic.	...	...	...
Morocco Empire.	6,000,000	280,424	214,510
Norway Kingdom.	1,500,000	1,160,992	630,773
Persia "	10,000,000	...	31,970
Portugal (and Colonies) "	6,349,000	2,281,844	2,225,495
Rome Pontificate.	3,125,000	...	...
Russia Empire.	75,149,000	16,201,498	5,446,879
Sandwich Islands Kingdom.	70,000	298	35,373
Siam "	...	75,240	13,556
SOUTH AMERICA:—			
Argentine Confederation } Republics.	1,200,000	1,101,428	1,820,935
Brazil Empire.	7,700,000	2,269,130	4,571,308
Chile Republic.	1,559,000	2,582,448	1,737,929
Ecuador "	1,041,000	107,033	76,271
New Granadian Confederation } Republics.	2,224,000	24,940	854,500
Peru "	2,500,000	2,581,138	1,428,172
Uruguay "	301,000	867,328	944,002
Venezuela "	1,565,000	...	327,357
Spain Kingdom.	21,307,000	8,026,600	5,078,551
Sweden "	3,734,240	3,193,308	940,613
Switzerland Republic.	2,535,000	...	...
Tunis Empire.	1,000,000	13,954	4,845
Turkey "	35,600,000	3,253,246	5,206,566
Moldavia and Wallachia "	4,000,000	2,252,242	201,273
United States Republic.	31,500,000	44,724,312	22,907,681
Western Africa "	...	1,776,565	1,145,434
	857,752,780	166,512,595	120,495,633

* The Two Mecklenburgs. Hanse Towns.

† Baden. Bavaria. Brunswick. Frankfort-on-the-Maine. Hanover. Hesse Cassel. Hesse Darmstadt. Nassau. Oldenburg. Prussia. Saxony. Thuringian Union. Wurtemberg.

entered into new commercial treaties with Russia, France, Morocco, Siam, China, Japan, Nicaragua, and other countries. The European States have also not been slow to avail themselves of the opportunity of extending friendly commercial relations with Foreign powers. Sweden and Denmark have concluded treaties with Persia; Denmark with Siam; Belgium with Peru and the Argentine Confederation; France, Russia, Holland and the United States with Japan; the States of the Zollverein with the Argentine Confederation; China with Russia and North America.

Very many new foreign ports have been opened to commerce, especially in the East; eight, for instance, in China, besides the concession of the free navigation of the great river Yang-tsi-kiang, seven in Japan, sixteen in Java, two in Sumatra, two in Borneo, several in the Philippines and Moluccas, and four in Hayti. The few statistical facts adduced will serve to show how much has been done in the brief space of ten years. How interesting, then, will it be to take stock next year of the World's progress in developing and utilising the boundless resources of nature, in extending scientific discoveries and manufacturing processes, in improvements in the arts, and in all those elements of national wealth which tend to advance the com-

forts of man and facilitate commercial intercourse, while they also lead us to reverence the wisdom and beneficence of the great Creator of the universe.

SHIPPING TRADE OF GREAT BRITAIN WITH FOREIGN COUNTRIES IN 1850 AND 1860.

1850.—FOREIGN TRADE.

	Entered Inwards.		Cleared Outwards.	
	Ships.	Tons.	Ships.	Tons.
BRITISH VESSELS.				
United Kingdom and Colonies	18,728	4,078,544	17,648	3,960,764
FOREIGN VESSELS.				
Russian	354	88,289	295	74,965
Swedish	402	64,732	394	60,917
Norwegian	1,272	218,329	732	113,335
Danish	1,787	136,594	1,830	148,669
Prussian	1,088	224,514	929	179,887
Other German States...	2,059	240,256	1,985	225,331
Dutch	1,320	116,410	1,029	124,034
Belgian	220	35,274	208	36,501
French	2,568	156,952	2,542	212,672
Spanish	150	23,717	144	22,611
Portuguese	106	11,682	62	7,414
Italian States	359	97,515	360	97,693
Other European States	81	23,667	67	19,493
United States	748	595,191	776	620,034
Other Foreign States..	7	2,030	10	2,658
Total Foreign	12,521	2,035,152	11,363	1,946,214
Total Brit. & Foreign.	31,249	6,113,696	29,011	5,906,978

1860.—FOREIGN TRADE.

	Entered Inwards.		Cleared Outwards.	
	Ships.	Tons.	Ships.	Tons.
BRITISH VESSELS.				
United Kingdom and Colonies	26,489	6,889,009	26,154	7,025,914
FOREIGN VESSELS.				
Russian	479	137,522	496	145,089
Swedish	1,252	210,983	1,473	238,524
Norwegian	3,290	731,924	3,263	724,840
Danish	3,488	344,139	4,210	415,848
Prussian	1,991	471,563	2,142	501,647
Other German States...	3,836	660,713	4,028	680,332
Dutch	1,952	278,798	2,081	288,592
Belgian	340	72,788	269	59,345
French	4,844	460,427	4,569	452,909
Spanish	267	71,828	265	71,008
Portuguese	159	37,116	155	4,800
Italian States	593	146,122	616	157,292
Other European States	598	190,644	602	192,835
United States	1,561	1,461,842	1,634	1,519,855
Other Foreign States..	24	7,367	26	7,677
Total Foreign	24,674	5,283,776	25,829	5,490,593
Total Brit. & Foreign.	51,163	12,172,785	51,983	12,516,507

Africa will be much better represented on the present than on the former occasion. Egypt and Tunis again appear in the list, and will no doubt make an equally interesting display. Great attention has been given by the French to the development of the products of Algeria, where there are now 203,000 Europeans.

The excellent permanent collection of Algerian products and manufactures in the Palais d'Industrie at Paris, is a proof of the exertions that have been made to draw forth its latent treasures, and hence a very extensive collection may be anticipated from thence in the French department. Large attention has been given to cotton production, and there were upwards of 6,000 acres under culture with this plant a year or two ago. Wool, silk, flax, and other textiles are produced there. Tobacco culture has been greatly stimulated by the offer of the Government to purchase six million kilogrammes annually, and already eight or nine million francs worth of tobacco are shipped. Valuable woods, dyestuffs, and tanning substances also abound.

Morocco will exhibit in 1862, a country with which we now carry on an extensive and increasing trade. The value of the external trade of Morocco has quadrupled in the past ten years. This may be accounted for partly by the introduction of a more liberal system of fiscal administration, the additional confidence felt since the new treaty, and partly by the unusually large demand for cereals, which originated during the Crimean war, and has continued ever since. Wool, silk, hemp, oils, gums, wax, and other raw produce will probably form the bulk of the exhibits.

The French settlements of Senegal and Gaboon will also send many products, and the Portuguese Colonies of Africa will be fully represented. The free African Republic of Liberia has applied for space on this occasion; and although its chief exports are ivory, cam-wood, and palm-oil, yet the miscellaneous products and manufactures of this independent offshoot from American slavery will be watched with interest. The general trade of Western Africa will be also well represented. There is less secrecy now manifested as regards the trade, which has been thrown open more generally, and is not now confined to a few large monopolists. In 1851 two or three London merchants only exhibited, now nearly all of them will take a part in the display of native produce and manufactures. To show the advance of legitimate trade on the West Coast, I may mention that the import of the chief staple (palm oil), to the United Kingdom alone, has increased from 21,722 tons in 1850, to 37,704 tons in 1860. The cotton progress of Western Africa is an interesting feature. In 1850 we received but 258lb. from thence; in 1860 2,069 cwt. So with ebony, and many other valuable woods. The scientific labours of Dr. Baikie, R.N., and Mr. Barter, up the Niger and its tributaries; of Mr. Gustaf Mann, in the Gaboon; and of Dr. Livingstone, in the Zambesi district, will also have developed much that is important and interesting in Central and Western Africa; while through Natal we shall receive wool and other African products from the Dutch settlements of the Orange River territory and the Transvaal State. Even from Madagascar there is a prospect of contributions under the rule of the new king, as Mauritius has sent a deputation, including several men of science. The African Aid Society, with Lord Alfred Churchill at its head, the African Steam Company, and many leading African merchants of London, are actively at work in obtaining a due representation of African products and manufactures.

North America, which showed to advantage in 1851, intends to be represented notwithstanding the deplorable internecine war. The Commission appointed by the President of the United States, under the authority of Congress, comprises a commissioner from each of the six States of Massachusetts, Connecticut, New York, Ohio, Maryland, and Pennsylvania, and also names agents who are to receive goods in Wisconsin, Illinois, Indiana, Minnesota, Iowa, Michigan, and California. The Executive Committee, which sits at Washington, includes the Hon. Edward Everett and the following officials:—The Secretary of State, the Secretary of the Interior, the Secretary of the Smithsonian Institution, the Superintendent of the Census, the Mayor of Washington, and the Secretary of the New York

State Agricultural Society. A government vessel is to bring over the goods.

Mexico had also announced its intention to represent its industry, but the present war proceedings will probably interrupt this. The Central American republics of Costa Rica, Guatemala, Honduras, and San Salvador, have also had space allotted them. The chief articles which furnish the exportable wealth of Central America are indigo, cochineal, coffee, cotton, sugar, hides, Nicaragua wood, balsams, sarsaparilla, tobacco, mahogany, &c. Passing southwards, we find next several of the States of the New Granada Confederation making busy preparations. Venezuela and Ecuador are also among the applicants. Bolivia does not show on the present occasion, and Paraguay is also out of the list; but Brazil, Chile, Peru, the Argentine Confederation, and Uruguay, complete the list of South American States that will exhibit.

In Brazil a local exhibition of raw products and manufactures was announced to be held in the capital of each of the twenty provinces of the empire, and the best of these products was to be sent to a metropolitan exhibition to be held at Rio Janeiro, in December. A choice collection would then be made by the Brazilian Commission, to be transmitted to London, and looking at the range of climate, great extent of country embraced, and variety of products, a most interesting display may be anticipated.

Even the Asiatic States have been moved to compete, since we have Arabia and Persia entering the lists with Europe. In 1851 Persia was only represented by a few articles exhibited by a London merchant—now pictures and products will be sent direct from Teheran; and here British commerce is making its way, since our exports to Persia have advanced from £3,000 in value to £32,000.

Passing eastward, we find that Siam has been opened up to British trade since the last Exhibition. Sir John Bowring concluded a new English treaty there in 1855, and my friend, Sir Robert Schomburgk, a gentleman distinguished for his scientific attainments, and his explorations in British Guiana, his valuable "History of Barbados," and other works, has been the Consul-General at Bangkok for the last four years. Sir Robert, who was then Consul for the Dominican Republic, sent to the Exhibition of 1851 a very interesting collection of products from St. Domingo, comprising woods, new starches, vegetable wax, copper and other ores. To show that he still regards with interest these competitive Exhibitions, and desires to develop the indigenous resources, and further the trade of the countries with which he is officially connected, I may state that, in a letter I have received from him, dated Bangkok, August 18, he says:—

"MY DEAR MR. SIMMONDS,—I am making a collection of Siamese raw produce, tissues, fancy works, &c., for next year's Exhibition. Colonel Cavenagh, the governor of Singapore, wrote, wishing me to incorporate the Siamese collection with that of the Straits Settlements, but I should rather like it to be separate. If, therefore, you can keep a space open, I shall place it under your care, and shall be glad if you will accept of it after the Exhibition is over."

The last consular reports of Sir Robert furnish much valuable information as to the trade and resources of that country, and its products are becoming better known in Europe. These embrace rice, sugar, sapan and other dye-woods, dragon's blood, dammer, gamboge, benzoin, stick-lac, ground nuts, til seed, cardamoms, fibres, teak, and other useful woods, such as rosewood, satinwood, ebony, and krachi wood. Sir Robert remarks, that a number of woods, the produce of the forests in the interior, might become of importance were their qualities for naval or civil architecture, or as woods proper for ornamental purposes, sufficiently known. Among others he especially mentions a wood called takieng, which, as far as regards size and quality, might become a rival to teak, possessing, moreover, the great advantage that it can be easily bent by artificial means. He noticed in the king's build-

ing-yard a log of this wood, 135 feet long, perfectly sound and without a flaw. Most of the ornamental woods of Siam are entirely unknown to cabinet makers, although their colour and high polish would render them valuable additions to the articles of export.

The King of Siam intends sending articles forward. Siam is a rising and prosperous state with which our trade is likely to become more extensive, if not direct, at least through, the great eastern *entrepot* of Singapore. It is fast increasing its mercantile marine, and now owns upwards of 30,000 tons of shipping, a dozen of the vessels being above 500 tons, and 30 of them steamers; several of the latter have been built at Siam.

The Dutch and Spanish Colonies of the Eastern Seas will no doubt be duly represented. Their numerous productions I dwelt upon at some length in the paper on the "Trade and Commerce of the Eastern Archipelago," which I read to the members last session. The Dutch Colonial Government formed a collection of objects for Paris in 1855 intended to exhibit the natural products and the industry of Java, and the other Dutch islands of the Archipelago. A trophy of boxes, barrels, woods, &c., formed the most conspicuous object in the Annexe, but it was undescribed, and unlabelled except as "musters of various plants." A Borneo Company, with a capital of £200,000, has been recently formed at Amsterdam, to develop the resources of that great island. It is under the patronage of the Dutch government, which takes one-tenth share in the concern.

In 1851 there were two or three specimens of Japanese products incidentally shown, consisting of copper, vegetable wax, varnishes, and coarse silk; but now that the trade has been opened up with that empire there will be a most magnificent collection exhibited.

The treasures of art, nature, and industry of Japan, will, through the efforts of our Minister and Consuls there, be well displayed, and the collection be especially rich in large and fine specimens of porcelain, bronzes, and lacquerware, in which the Japanese especially excel, in a way to rival the finest works of the same character in Europe. There will also be a good variety of raw and manufactured commercial products, and Her Majesty will doubtless exhibit the Tycoon's presents, which will serve to illustrate Japanese progress in arms, armour, harness, screens, and other manufactures.

Although China will directly, as a foreign state, take no part in the Exhibition, yet, indirectly, there will be a very interesting collection of products and manufactures of this industrious nation shown, through the Hong-Kong Committee, the consular establishments at the northern ports, and by merchants and others at home. Especially will there be magnificent trophies of the spoils from the Emperor's Summer Palace, in rich silk hangings, gold and velvet embroidered carpets, bronzes and vases, ivory carvings, and such like.

Even the Islands of the Pacific will not be unrepresented. France will exhibit from its oceanic dependencies. Mr. Consul Prichard will send wool, cotton, and other indigenous products of the Feejee islands which are destined to pass under our sovereignty. Captain Denham, R.N., will exhibit articles collected during his survey of the South Sea Islands, in her Majesty's ship *Herald*. The Sandwich Islands, now a flourishing state under the name of the Hawaiian Republic, have had space allotted to them for their products, on the application of their consular agent in London. A very good collection was sent in 1851, but it arrived too late.

Returning now to Europe, France will be, perhaps, the most formidable of the foreign contributors, as the originator and most active promoter of these Exhibitions, and because ample funds will be placed at the disposal of the Commission. Already £50,000 has been voted for expenses, and fully as much more will probably be expended. Great Britain spent only £40,000 in the expenses attendant on forwarding British and colonial goods for exhibition at

Paris in 1855. There were 1,700 French exhibitors at London in 1851, and 2,500 English exhibitors at Paris in 1855. Although she has received the lion's share of space, France is reported to be dissatisfied with her allotment. Something like 132,000 square feet has, I believe, been assigned to our neighbour, against 119,000 feet in 1851; but in these details I must be understood not to speak with any official precision, as the exact apportionment has scarcely yet transpired. There have been nearly 9,000 French applicants for exhibiting space on this occasion, of whom 5,000 were from the Departments, 3,200 from Paris, and the remainder from Algeria. These, however, have been gradually reduced down to about 3,500. There is one satisfactory feature with regard to the French department, and that is that the exhibitors are likely to be ready in time on the present occasion, instead of being about two months in arrear as in 1851 and 1855.

The Emperor Napoleon expressed the strongest wish to send over the most celebrated pictures from the Louvre for the Fine Arts Department, and when he found that the early closing of the lists, and the large applications for space prevented their being received, he determined to hang the walls of the French Department at least with some of the finest paintings. Among the pictures coming from France will be that of the Battle of Solferino, by Horace Vernet.

With the space at her command, and the energy, skill, and funds necessary for the purpose, France will, no doubt, make a most creditable home and colonial display. She will gather together the best and most varied specimens from her numerous outlying dependencies, which, exclusive of Algeria, contain a population of one million souls; from her Pacific possessions, the Marquesas, Society Islands, and New Caledonia; from her Indian dependencies, Cochín China, and Reunion; from her African settlements, and from her American Colonies, Guiana, Guadaloupe, Martinique, St. Pierre and Miquelon.

The States of the Zollverein that exhibited in 1851 were 25 in number, namely, the kingdoms of Prussia, Bavaria, Saxony, and Wurtemberg, the Grand Duchies of Baden, Hesse, Saxe-Weimar, and Luxembourg, Electoral Hesse, the Duchies of Brunswick, Nassau, Saxe-Altenburg, Saxe-Meiningen, Saxe-Cobourg, Saxe-Gotha, Anhalt-Dessau, Anhalt-Köthen, Anhalt-Bernburg, the City of Frankfurt, Principalities of Reuss, elder and younger, Lippe-Biesterfeld, Schwarzburg-Rudolstadt, and Schwarzburg-Sondershausen.

In 1854 the second of the quinquennial exhibitions of the produce and manufactures of the States composing the German Customs Union was held at Munich, and a report thereon, by Mr. Consul-General Ward, was published in the 3rd vol. of the Society's *Journal*.

Austria (whose commercial relations with the Union had been drawn closer by the treaty of February, 1853), as well as the several States in the North which are not members of the Union, were invited to contribute. This proposal was accepted by Austria, the Principality of Liechtenstein, the Hanseatic Towns, and the Grand Duchy of Mecklenburg-Strelitz, but Mecklenburg-Schwerin did not exhibit. Of the 33 contributing States 26 were members of the Customs Union. The only foreign countries which took part were the non-German dominions of Austria, it being contrary to the principles of the German Customs Union to invite foreign countries generally.

There were about 7,000 exhibitors, of whom 2,200 were in textile manufactures, 1,100 in metal manufactures, and 800 in porcelain, glass, &c. According to Mr. Ward's report, "This exhibition was rather a display of the industrial powers of Southern Germany than of those of the entire country. Austria was glad to seize the opportunity of taking part for the first time in an exhibition of industry of the German Customs Union. She made great exertions to be well represented, and was not altogether unsuccessful. The Austrian Government, which ardently desires the incorporation of the whole of Germany into a General Customs Union, was desirous of showing that the

Austrian manufacturers were making steady progress, and were, in some respects, already qualified to compete with the industry of the North and West."

The textile manufactures, Mr. Ward considered, had not made much progress. In machinery, and the working of metallic substances, there were more signs of improvement, and in articles of an artistic character, whether belonging to the department of the Fine Arts, or of a mixed nature, combining beauty of form with subserviency to practical utility, there were many models well worthy of our notice and imitation.

The production of fine wools in Germany seems to be on the decline, partly, perhaps, owing to the increasing importation of the wools of Australia into Europe. The entire stock of sheep in the States of the German Union is scarcely more now than it was twenty years ago, being set down at 22,000,000 head, a number nearly equalled by the British colonies in Australia, and from whence we are at present supplied with about 60,000,000lbs. of colonial wool annually. The woollen manufacture is undoubtedly still one of the most flourishing branches of German industry. Wool has, in many articles, taken the place of cotton for female dresses, light woollens and worsteds being generally preferred.

From the commonest blankets to the finest cassimeres and woollen velvets, specimens were displayed at Munich, and the Austrian broadcloths from Bohemia and Moravia gave evidence of having arrived at a high degree of perfection. The Austrian velvets, plush, and embroidered stuffs, were generally good, but in plain silks and ribbons she stood below the Zollverein. A silver table service, made for the Crown Prince of Saxony, from the designs of Professor Reitschel, possessed much artistic merit. The marbles, porphyries, and mosaics formed some of the most striking objects of the Exhibition, and in many of them a great deal of artistic beauty was observable. The Great Exhibition of 1851 gave Germany the spur in some branches of her industry, and the French Exhibition in 1855 had a similar effect.

In Prussia, there are already about 500 intending exhibitors announced as prepared to take part in sending contributions. The pictures from the Royal Palace will alone occupy 1,000 feet in the Fine Arts Gallery, and the magnificent service of plate presented by the City of Berlin to the Crown Prince on his marriage, will form an attractive feature. The "true and veritable" manufacturer of eau de Cologne, M. Jean Maria Farina, intends keeping a fountain of this perfume playing during the whole term of the Exhibition, no doubt to the great delectation of the ladies. Recently, the Secretary of the Prussian Legation, and two of the Prussian Commissioners, have had personal interviews with Her Majesty's Commissioners, arranging details and announcing results accomplished.

The States of Northern Germany, not belonging to the Zollverein, which took part in the Great Exhibition of 1851, were the kingdom of Hanover, the Grand Duchies of Oldenburg, Mecklenburg-Schwerin, and Mecklenburg-Strelitz, the Duchy of Holstein, and the free cities of Hamburg and Lubeck.

The President of the Polytechnic Society of Leipsic has issued a circular to the Governments of Germany, earnestly entreating that measures may be taken for causing the productions of the country to be properly represented in 1862. Kaulbach's royal portraits, and the bronzes and medals from Hanover, will possess considerable interest.

The empire of Austria will be represented by about 1,800 exhibitors, from Austria Proper, Hungary, Croatia, and Transylvania. Austria will be particularly strong in agricultural and mineral products. The Commune of Vienna has voted 10,000 florins to assist such exhibitors as are not able to defray the transmission charges. The Emperor will send the best fine art treasures from all his palaces, to Paris he only sent those from the Belvedere. The oil paintings will date from 1784, commencing with the works of the great master, Heinrich Fuger.

In the Belgian Decree of April last, appointing the Royal Commissioners, it was stated, that taking into consideration that the Exhibition of 1851 entailed an outlay on Belgium of nearly £7,000, though it was not open to every branch of art which will be represented at the forthcoming Exhibition; and being fully persuaded that the Belgian exhibitors on the present occasion will be much more numerous than was the case either in 1851 or even in 1855, the Commission recommend that the sum of £9,000 should be applied for from the Government, to defray the necessary expenses, &c. This amount was granted. The Duke of Brabant accepted the honorary presidency of the Commission, which is one of the most extensive and influential of any yet nominated. Circulars were addressed, in May, by the Secretary of the Minister of the Interior to all the Chambers of Commerce, requesting their cordial support; and to the principal artists in the country, inviting them to contribute a choice selection of their works, which are to date from the year 1830. The King has consented to lend all the Royal pictures. The President of the Commission and the London Commissioners had an interview with Her Majesty's Commissioners, a few days ago, reporting progress.

In Austria, Local Committees, assisted by the Presidents of the various Chambers of Commerce, have been formed for the purpose of stimulating the manufacturers, and to select the articles of proposed exhibitors. Every facility is also to be afforded on the Government lines of railway, for the transmission of goods at a reduced scale of charges.

The British Consul-General at Leipzig, states that the British trade with Germany has very much increased of late years, especially in cotton and linen yarns and stuffs, and pig and bar iron. Mr. Koch, our Consul at Frankfurt, under date September 29, 1859, observes:—"Intelligent travellers who have not visited Southern Germany for a number of years, must now be forcibly struck with the increased activity, industry, and commercial intelligence of the population. The increased facility and economy of intercourse, which enables thousands of Germans to travel and visit other countries, has mainly contributed to expand their ideas. Of the numberless Germans who visited the Great London Exhibition of the year 1851, the greatest proportion brought home the most favourable impressions of England generally, and of the enterprise and high intelligence of the British merchants and manufacturers, and they have profited by what they have seen. Prussia, in introducing the Zollverein, has certainly the merit of having thereby mainly contributed to the national prosperity of Germany."

From Russia there will be many rare and remarkable objects, such as porphyry candelabras and columns, jasper cups of gigantic size, large mosaics, malachite articles, and some picturesque and interesting trophies. The Emperor will contribute the best of his pictures from the Hermitage and the Winter Palace. Russia will no doubt stand well with its iron and steel manufactures, for which it received a Council Medal in 1851. Many of the articles intended for exhibition have already arrived, as they had to be dispatched from the Baltic before the navigation closed. The International Exhibition is said to form the general subject of conversation in the higher circles, while it occupies equal interest among the workmen and students.

The Kingdom of Denmark intends to contribute largely, both from Denmark Proper, the Duchies, and her Colonies.

In Spain, an Exhibition of Industry was announced to be held in Madrid next year, confined to the products of Spain, Portugal, and the American republics of Spanish origin. This will probably now be postponed, as preparations are making to transmit a creditable collection to the International Exhibition. The Duke de Veragua is President of the Local Commission, the Minister of Public Works is actively occupied in the matter, and Commissioners have been sent by the Government into all the provinces urging the various manufacturers to forward some-

thing to the Exhibition. Seville is going to send a good many articles.

Portugal is working hard, the King Regent being the President of the Commission.

The Roman collection of 1851 was principally interesting for its sculptures, cameos, and mosaic work. In 1859, there was an Exhibition of Industrial Products at Rome. On the present occasion but little was anticipated from the Roman State, but very recently an announcement has been made that the products from the Pontificate will require a space of 3,000 feet; that a Commission has been appointed to assist the Ministers of Commerce and of Public Works in selecting the objects to be sent; and that the charges of transmission and of insurance will be met by the government.

United Italy, now numbering a population of 22,000,000, intends to make a noble display, especially in the fine arts department; indeed, its application for hanging space was for about one-tenth of the whole at the disposal of the committee. The Institute of Fine Arts in Naples undertakes the reception of works intended for exhibition from the Neapolitan Provinces. The pictures to be sent will date from 1784, recording the revival of Italian art by Canova. The Italian Commission is a most numerous and influential one, embracing all the present and past Ministers of State and officials. Among other objects in the Italian court will be a magnificent display of silks and velvet.

Turkey, which has been a little dilatory in applying, now comes in and wants much more than the space that can be allotted to her.

Thus much for the movement in the principal countries intending to compete.

In the words of Mr. H. Cole, C.B., in his report on the Paris Exhibition, "An extended knowledge of the nature and capacities of production peculiar to each country, is the first and most obvious result of International Exhibitions. This knowledge is spread not merely from nation to nation, but most usefully between the producer and consumer, establishing a direct connection between the two. So long as the United Kingdom enjoys its present advantages in possessing great mineral resources, as well as those facilities of transport which arise from its insular position, and the physical energy of its people does not decline, it would seem to follow that no result but a highly beneficial one would ensue from that extensive publicity of its productions which is conferred by these exhibitions."

"International Exhibitions will extend and hasten the development of the productive industry of all nations, but they are not likely to counteract those natural laws which are regulated by the climate, the physical condition, and even the political institutions of each. Almost every nation has something peculiar to itself which is useful to another, and it is the increased ease of interchange which International Exhibitions chiefly promote. Looking to their influence on this country, International Exhibitions may be said to have been of eminent use. They have created both an earnest wish for the better education of all classes, and even, perhaps, an exaggerated dread of being outdone by other countries, but at the same time a firm resolution to advance."

"Almost every branch of national industry has shown progressive improvement since 1851, and notwithstanding greatly increased taxation, the general commerce of the kingdom has made enormous strides since that year, which, in some measure, ought to be attributed to the two International Exhibitions which have taken place. It seems, therefore, to be a conclusion which cannot be gained, that these Exhibitions have both amply repaid the United Kingdom for the exertions and outlay which have been made."

Finally, I may observe that, by the original programme, the members were to have had under consideration this evening "A Comparison of the years 1851 and 1861." You have had laid before you instead our commercial progress from 1850 to 1860, as regards Foreign countries and

Foreign shipping, 1851 and 1861 being exceptional years, which can scarcely be fairly contrasted, even were the statistical returns for the present year complete; and moreover the subject has been pre-engaged. I have, however, opened to you a few pages from the national ledger, which will serve to show what has been the industrial progress at home, and I have also told you something of what has been done abroad. I have gone over the foreign data of the Exhibition of 1851, endeavoured to trace some of its results, and shadowed forth in outline the steps already taken by the principal countries in order to be fitly represented in the forthcoming Exhibition. To have done this fully for all would have been impossible in the time allotted here. But I trust it has enabled the members to obtain some little insight into the great exertions making, and that it will lead to much additional information being furnished in the course of the discussion, by many who are much better informed on special details than I can be.

It results from the course of our inquiry that we shall have represented next year in London the best products, art, and industry of Foreign Countries, having an aggregate population of over 900 millions of people, besides evidences of the scientific research, taste, manufactures, industry, and wealth of the large population of the United Kingdom and its dependencies. The contributions from foreign countries will be far more extensive and universal than in 1851, and the countries unrepresented will be very few and unimportant. That the International Exhibition of 1862 will be a great success, is now beyond a doubt. Everything thus far has tended to favour it. Foreign governments and private exhibitors have extended to the undertaking the warmest support, honorary and pecuniary, and all have worked zealously, energetically, and systematically.

The results of these collective and combined endeavours cannot fail to be advantageous hereafter to Great Britain and the world at large.

DISCUSSION.

The CHAIRMAN, in inviting discussion, said he saw at the table one of the Vice-Presidents who had recently returned from Florence, where he had been representing the Society, at the request of the Council, and he (the Chairman) hoped he would be induced to favour the Society with a few remarks.

MR. WINKWORTH said that he cheerfully responded to the invitation of the Chairman, but as he had only arrived in London the previous day, he feared that anything he could say on the subject before the meeting would be of rather a miscellaneous than concise character. He had accepted the invitation of the Council to become one of a deputation to the Florence Exhibition, and had been appointed to report specially on the department in which his previous experience as juror and reporter in 1851 and 1855, might be supposed to have in some measure qualified him, viz., silk, raw, thrown, and manufactured. In the discharge of the duty thus entrusted to him, he was brought into juxtaposition with many jurors and others competent to assist him, and the circumstances to which he had just alluded gave him a position of which he was not slow to avail himself. The results of his mission he should take occasion to embody in a report to the Council, as soon as he was able to arrange the materials he had collected. In the meantime, it would be agreeable to them to know that Mr. Simmonds (who never touched upon any subject, whether at a long or a short notice, without exhausting it, much to the advantage of those who heard him) had by no means exaggerated the expectations that had been formed as to the manner in which foreign countries, especially those of France and Italy, would respond to the invitations given to them. He had had the opportunity, within the last few days, whilst in Paris, of consulting with some of the most eminent dealers in silk goods, and he knew it was the intention of

the manufacturers of Lyons and St. Etienne, not only to exhibit largely, but to exhibit more specially than they had done before. They knew that in the Exhibition of 1851, many silk goods were exhibited which had, in fact, been manufactured some years previously, and were culled from the best specimens they had been able to produce in that country; but on the ensuing occasion they intended to exhibit their very latest and best productions. In point of fact, this they must do, for the late commercial treaty would expose them to a measure of competition with English silks which they had not experienced before, but which he hoped they would find to be really a trial of skill as producers, in which, paradoxical as it might appear, both parties would be gainers. The truth was there were classes of goods which they could produce with greater facility and excellence than could be done in this country. On the other hand, they had candidly admitted that they had no conception we could produce anything so well made as many of the specimens he had shown them from England. To go back to Italy, without anticipating what his friends Mr. Digby Wyatt and Mr. Foster might have to say of the departments on which they had undertaken to report, he might state that the Exhibition at Florence was a highly creditable one, considering it was purely national, and that it was the first attempt of a new nation which had been heretofore split into small and separate governments, in many instances fettered by vexatious fiscal impediments, which had, of course, exercised a deleterious influence over their productions. It was now a large and almost complete kingdom, and considering they had only three months' notice that this National Exhibition was to be opened, they had collected a most creditable display of their ability as producers, but which, as far as time would permit, would be surpassed by the specimens they intended to send over to this country next year. In the department of silk, raw and thrown, the Exhibition at Florence far excelled those of 1851 and 1855; and they had told him that on the ensuing occasion their display would be greater in quantity, and, if possible, better even in quality. He might add that there were one or two departments of manufactures in Italy in which they had exhibited considerable progress, and from which they intended to make a selection for the Exhibition in this country next year. These were particularly sculpture and mosaics. With respect to the statistics to which Mr. Simmonds had drawn their attention, they knew that the kingdom of Italy being really a new one, it was very difficult to obtain correct figures and details, but, as far as practicable, Mr. Simmonds appeared to have obtained correct information and to have made good use of it. He had only to say, in conclusion, that altogether he must confirm, as far as his opportunities of observation and information went, the opinion which Mr. Simmonds had so well expressed, viz., that the ensuing display of progress made in Arts, Manufactures, and Commerce, since 1851, would fully justify the Society in the measures they had successfully adopted to inaugurate another International Exhibition.

The CHAIRMAN said it had been intimated to him that there were probably some gentlemen present representing foreign countries as Commissioners for the Exhibition. If there were he should not only be glad to hear their remarks, but also to hold out to them the right-hand of fellowship on this occasion.

MR. MANLY HOPKINS (Commissioner for the Sandwich Islands) said the king of the country which he had the honour to represent had warmly responded to the call to contribute to the forthcoming Exhibition. That country had recently undergone a transition, and had been thrown very much upon its own natural resources. Amongst its products he had no doubt would be exhibited sugar and coffee as fine as were produced in any part of the world. They would also exhibit a new description of lichen, which was now used in the States for the purpose of making stuffing for bedding and pillows, and which he

believed would eventually be used for those purposes in this country. The people of the Sandwich Islands were now growing wool, but their manufactures at present were few and small. They were, however, a nation bursting rapidly into civilized life, and accepted all European traditions of civilization very readily indeed. He hoped in the course of a few months to produce a volume on the subject of the Sandwich Islands, which he believed would throw some light upon the history of a people of whom hitherto very little had been known, and who had been lost sight of in the great mass of mankind. He added that with a view to the improvement of the breed of sheep in that country, the Emperor of the French had sent out four of his beautiful flock as a present to the king.

Mr. HEMMING (Commissioner for Venezuela) said, 'at the present moment he could add but little to the information which had been given in the paper with respect to Venezuela. From the time when the notices were first issued by Her Majesty's commissioners, inviting foreign countries to contribute to the Exhibition, he had urged upon the government of Venezuela, the necessity of sending, as far as they could, the best samples of the various productions of the country, many of which they had in great perfection. The meeting was no doubt aware, that for a long time past, that part of the world had been politically in a disturbed state, which had prevented exertions being made to develop the resources of the country; but in a letter which he had received by the last mail from the foreign secretary, a hope was expressed that they were so far settling down, that they would be able to give some attention to the carrying out of these objects, which he had no doubt would advance the commercial intercourse between that country and England. There was one subject which was at the present moment of universal interest—that was the growth of cotton. It had long been known that Venezuela produced some of the finest cotton in the world; but in proportion as progress was made in the cultivation of cotton in the Southern States of America, so much capital being embarked there and machinery imported, in like proportion were the cotton growers of Venezuela discouraged, not possessing such advantages, and the result had been that for some years past they had given their attention more to the cultivation of coffee, cocoa, and sugar, all of which they produced in the greatest perfection. It happened, however, that the exports of those commodities had been principally to Spain and Hamburg, and he had had little opportunity of judging of their quality in this country. In April last he sent to Venezuela a list of productions for which that country was most famous, urging them to send over samples, and assuring them that, to the best of his humble abilities, they should be properly displayed in the approaching Exhibition. He was quite convinced that, with the favourable climate and great fertility of the soil of that country, a large number of products likely to attract favourable notice here would be sent. At the present time they were large customers to England; and in a period of three months they took from Liverpool manufactured goods to the amount of 600,000 dollars, without having returned to this country a shilling's-worth of the productions of their own soil. His great object was, that there should be an interchange of their valuable productions in return for the manufactured goods which they took from England; and if they sent us cotton and took back our manufactures, it would be an immense advantage to both countries.

The CHAIRMAN remarked that it was of great importance that they should send samples of their cotton.

Mr. HEMMING added that he had obtained samples of the latest exportations of cotton from Venezuela to Hamburg. At a time when the cotton of Louisiana was bringing 6½d. per pound, that from Venezuela was fetching 7d. per pound. The merchant by whom the cotton was shipped had told him this article paid him better than any other description of goods he exported.

Mr. GERALD RALSTON (Commissioner for Liberia) anticipated that a goodly number of articles would be sent from the country which he represented. He was happy to say the English Government had favoured them by ordering the Royal Mail steamer to call there in January to bring over the articles for the Exhibition in May. Those articles would consist of coffee, sugar, camwood, ivory, gold dust, cotton, ground nuts, and a great many other productions, and he believed the specimens of cotton exhibited would not be the least interesting amongst them. Mr. Thomas Clegg, of Manchester, who had devoted so much attention to the procuring of cotton on the West Coast of Africa, had informed him that the specimens sent from Liberia to the Cotton Supply Association of Manchester were decidedly excellent, and were better than any received from the Southern States of America, excepting the Sea Island cotton. Unfortunately the Liberians had not hitherto devoted themselves to the production of cotton, because they had found it more profitable to cultivate sugar. But he thought it would be worth their while to devote more attention to cotton, and he had no doubt their exports of that article would soon be very largely increased.

Mr. MORGAN said he did not come within the category of those who had previously addressed the meeting, as the official representative of any foreign country, although he aspired to represent every one of them. He had set on foot a scheme to assist the exhibitors in the foreign departments, and he fully endorsed all that had fallen from Mr. Simmonds that evening. What that gentleman had stated was, no doubt, in a great measure derived from official sources, whilst his (Mr. Morgan's) information was obtained from private sources. He had sent out representatives to Spain, Portugal, France, and British North America, and another was just about to start for Berlin; and from all the information he had received, he quite coincided with the statements Mr. Simmonds had made. Not having been present during the reading of the early part of the paper he was not aware whether Mr. Simmonds had referred to the fact that there was an intention on the part of the French workpeople to visit the Exhibition in large numbers. When he was last in Paris, measures were being taken for organising the visit of large numbers of the *ouvriers* of that city. He believed there would be no difficulty in effecting that, but the difficulty would be in providing for such masses of people when they arrived. It had been matter of discussion in this room that there should be a reduction in the entrance fee to the Exhibition to the working classes, and he hoped that subject would not be lost sight of. With regard to Canada, it appeared from the latest letters he had received, that nothing definite had yet been done there with regard to contributions to the Exhibition. The authorities had refused to advance any money towards the fund. Private exhibitors were anxious to come forward, but were holding back to hear the ultimate decision of the government with regard to the aid they would grant in promoting this object.

The CHAIRMAN said upon him now devolved the easy and grateful task of moving a vote of thanks to Mr. Simmonds for the facts so industriously collected, and he believed so accurately laid before them—facts which would not cease to be of value when this meeting terminated, but which they would afterwards consult in print with satisfaction, and he had no doubt with profit. Mr. Simmonds had made one remark, which was at the bottom of the whole of the case—that was that it was for the interest of every country to communicate and transact business with every other country; that each country produced something peculiar to itself and valuable in its nature, which it could exchange with other countries with profit to both. There were some countries on the earth which had been peculiarly the fields or theatres of the great wars that had taken place—the Netherlands might be mentioned as one instance. It happened at the present time to be the good

fortune of happy England to be the battle-field of peace—to be the spot on which the nations of the earth were to assemble to display their rival productions and to compete in bloodless contests for the laurels of industry. It was, he apprehended, a great source of happiness to every reflecting Englishman that their country should, under the favour of Heaven, be the chosen spot for such an exhibition, and there was one nation in particular on the face of the earth—the nation of Italy, which England would be especially happy at the present moment to hail as a sister in the works of art, science, and manufactures. That every country might assemble among them with its productions, that every country which came might profit itself—for we should certainly gain no exclusive advantages—that they might all reap benefit from this exhibition of industrial talent and art, was his most sincere wish, in which he was sure all present would join, as they would also join in permitting him to convey their best thanks to Mr. Simmonds for the very able and valuable paper with which he had favoured them that evening.

Mr. MURCHISON seconded the vote of thanks. He said they were accustomed to hear that it was an ill-wind that blew nobody good; and if there was one fact more prominent than another in the paper read and in the discussion, it was this—that more countries than one were prepared to send us cotton of superior quality.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 4th December, a Paper by Captain William C. Phillpotts, R.E., "On the Building for the International Exhibition of 1862," would be read.

JOHNSON'S DEEP-SEA PRESSURE-GAUGE.

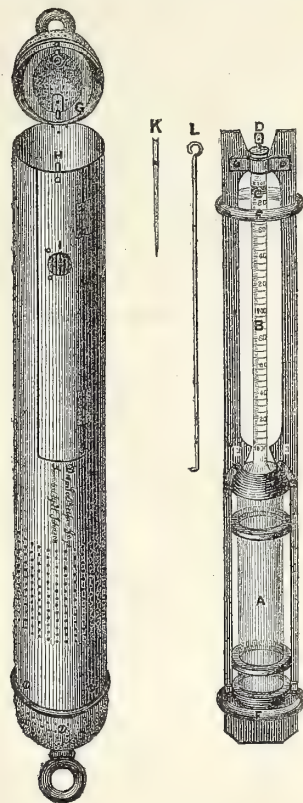
In very deep soundings the pressure of the water is too great to admit of its measurement, except by the use of a body possessing a very slight degree of elasticity.

Mr. Canton, in the year 1761, communicated his observations on the compression of water, which he found to be one part in 21,740, under the pressure of one atmosphere, and in water placed under a receiver, he found an expansion of the same amount, when the air in the receiver was exhausted. Mr. Perkins found a diminution of $\frac{1}{150}$ ths of the bulk of water under 1,120 atmospheres; that is, about one part in 19,000 for one atmosphere. Water, therefore, possessing this slight degree of elasticity, appears well adapted to determine its pressure at great depths. It is well known that a cork fitted into the neck of a bottle, and lowered in water, will be driven into the body of the bottle if the depth be sufficient; or, if of less depth, that it will be driven down a certain distance, according to the depth to which it is lowered, and that it will as gradually ascend to its original position on being raised to the surface. A gauge made of metal was exhibited last year at the Society of Arts Exhibition of Inventions, and at the meeting of the British Association, reference then being made to the use of glass to vary the experiments, as with metal it is impossible to see when the instrument is free from air bubbles. Mr. Johnson, therefore, had prepared one of glass, which was exhibited by Mr. Glaisher, in Section A, at the last meeting at Manchester.

The instrument now figured is of glass entirely; it consists of a cylindrical glass vessel, with a finely graduated long stem or neck, within which is placed an elastic ring and an elastic stopper; the latter in action pushes the former down the stem, and leaves it at its lowest depression, where it remains acting as an index, whilst the stopper itself again ascends the stem.

In the cut, A is the cylinder; B, stem with gradual

scale; C, flat elastic ring or index; D, elastic stopper; E, metal frame lined with caoutchouc; F, caoutchouc rings, protecting gauge from concussion; G, caoutchouc rings at top and bottom of case, securing the frame in position; H, metal hook on door, securing the top of case; I, clasp to door, let in to avoid projection; K, "vent" or grooved needle, inserted with stopper; L, brass hook, used to draw up elastic ring.



Some few precautions are necessary to be attended to before use, viz., the vessel must be well rinsed with boiled water, for the purpose of preventing the adhesion of air to its inner surface; next it must be filled with sea-water which has been boiled, and thus freed from air, to exclude all air from the entire vessel and stem.

In this state it is ready for use, and the first step to be taken is to insert the elastic ring and the stopper, with a small grooved needle by its side, thus reserving a small opening for the escape of superfluous water, pressing the stopper so far down the stem, that its lower edge and the first or zero line (marked 2000) on the scale are coincident—then withdraw the grooved needle, and the elastic stopper will tightly fit the stem. To prevent excessive friction of the stopper, it should be slightly lubricated occasionally.

On lowering the gauge into water of greater pressure or density than that of the water contained within it, the latter is compressed till it is of the same density as the water by which it is surrounded, and the elastic stopper is pressed down the stem towards the cylinder, at the same time pushing the elastic ring before it. On raising the gauge from water of greater to water of less density, the water contained within the gauge expands, and the elastic stopper is gradually pressed upwards, leaving the elastic ring behind. On arriving at the surface the lower edge of the stopper should be found at zero, and the elastic ring opposite to that division on the graduated stem marking the degree of compression of the water at the greatest

depth to which the instrument has been lowered. This depth should be ascertained by the sounding line, to which, at least for some time, the instrument in each experiment should be attached. The mass of water in the cylinder and stem is considered to be divided into 2,000 parts, of which the stem contains one-tenth or 200 parts; these are numbered from 1,800 to 2,000. Each part on the stem may easily be read to a tenth, or a 20,000th part of the whole.

A compression of one part in 20,000 is caused by a pressure of 15·8 lbs. auvoidupois, or a depth of sea-water of 35,456 feet, or nearly six fathoms. This result is confirmed both by the experiments of Mr. Canton and Mr. Perkins, and Mr. Johnson, and appears to be a perfectly safe basis for the compilation of tables of comparison and pressure. It is, however, highly desirable that the depths as thus determined, should be compared with those determined at the same time by soundings at different depths, as such would furnish the corrections, if any, necessary to be applied, and give confidence in the indications by the pressure gauge, and enable it to be used with confidence when strong currents render the use of the lead uncertain.

In observation, a small correction will be necessary to be applied on account of variation of temperature, and also for friction; this variation of volume is not uniform, being greater at high than at low temperatures. From many careful experiments made during the past year, it is found that 20,000 parts of boiled sea-water, at 86° Fahr., contract to 19·945 at 70°, to 19·899 at 50°, and to 19·880 at 31°.

The following table shows the variation in the volume of sea-water, boiled to free it from air, with change of temperature:—

THERMOMETER 67·5° FAHR. BAROMETER 29·92.

DEGREES.	NO. OF PARTS.	DEGREES.	NO. OF PARTS.
Fahr.		Fahr.	
86°	20000·0	53°	19905·0
85	19996·0	52	19903·0
84	19992·5	51	19901·0
83	19989·0	50	19899·0
82	19985·5	49	19897·0
81	19982·0	48	19895·0
80	19978·5	47	19894·0
79	19975·0	46	19892·5
78	19971·5	45	19891·0
77	19968·0	44	19890·0
76	19964·7	43	19889·0
75	19961·5	42	19888·0
74	19958·25	41	19886·7
73	19955·0	40	19885·5
72	19951·5	39	19884·5
71	19948·0	38	19883·5
70	19945·0	37	19883·0
69	19942·5	36	19882·5
68	19940·0	35	19882·0
67	19937·5	34	19881·5
66	19935·0	33	19881·0
65	19932·5	32	19880·5
64	19930·0	31	19880·0
63	19927·5	30	19880·0
62	19925·0	29	19880·0
61	19922·5	28*	19880·0
60	19920·0	27	19880·0
59	19917·5	26	19880·0
58	19915·0	25	19880·0
57	19913·0	24	19880·0
56	19911·0	23	19880·0
55	19909·0	22	19880·0
54	19907·0		

* A gentle motion kept up to equalise the temperature of the Sea Water has prevented its freezing at 28·5 deg.

PETROLEUM SPRINGS IN NORTH AMERICA.

By Dr. A. GESNER, F.G.S.

In a paper read before the Geological Society, on the 6th November, the author, after some observations on the antiquity of the use of mineral oil in North America and elsewhere, and on the present condition of the oil and gas springs, and the associated sulphur and brine springs in the United States, stated that 50,000 gallons of mineral oil are daily raised for home use and for exportation. The oil region comprises parts of Lower and Upper Canada, Ohio, Pennsylvania, Kentucky, Virginia, Tennessee, Arkansas, Texas, New Mexico, and California. It reaches from the 65th to the 128th degree of long. W. of Greenwich, and there are outlying tracts besides.

The oil is said to be derived from Silurian, Devonian, and Carboniferous rocks. In some cases the oil may have originated during the slow and gradual passage of wood into coal, and in its final transformation into anthracite and graphite—the hydrogen and some carbon and oxygen, being disengaged, probably forming hydrocarbons, including the oils. In other cases, animal matter may have been the source of the hydrocarbons.

Other native asphalts and petroleumums were referred to by the author, who concluded by observing that these products were most probably being continually produced by slow chemical changes in fossiliferous rocks.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(Continued from Vol. IX., page 816.)

REMARKS ON THE PRODUCTIONS AND EXPORTS OF PARÁ, (BRAZIL).—*Minerals*.—Of the mineral wealth of the two provinces of Pará and of the Upper Amazons little can be said, except to state the positive fact of its existence. Hitherto it has been totally neglected.

Gold, iron, quicksilver, traces of copper, &c., are to be mentioned amongst the metals which exist in various parts of this magnificent territory.

Gold exists in large quantities, not only along the banks of the Amazons' tributaries on either side, such as the Tocantins, the Pacaja, the Acara, the Madeira, the Jarí, &c., but even along the creeks which discharge themselves directly into the sea. It is found, as in Australia and California, in fine scaly dust, heavy granules and nuggets on and near the surface; and, as in California, the "washing stuff," or earth containing a remunerative quantity of gold, is more abundant in proportion to the unproductive earth, than in most of the Australian diggings. It is also stated, with much apparent reason, that auriferous quartz abounds in the range of high ground, which, after winding in a direction to E.S.E. from the Isthmus of Darien, is intersected by the Valley of the Amazons, about 700 miles from the mouth of that river. This range, so to call it, is, as it were, a spur projected from the northern continent, and juts out into the British, Dutch, and French territories of Guiana. Diamonds are amongst the principal gems which are to be found at Pará (Brazil). As far as they have yet been detected, they have been small. But as the interior has been barely visited, except very cursorily, even by casual exploration, the supply of diamonds may be as great here as in the province of Bahia. Common salt, though not found within the limits of these two provinces of Brazil, would, if elaborated, contribute to the trade of this outlet. I am indebted to Mr. Richard Spruce, a traveller who is collecting botanical specimens for the gardens at Kew, for the information that vast extents of territory, (within the confines of Peru and Ecuador), through which the tributaries of the Amazons descend are covered with a deep crust (often several feet in thickness) of a salt almost free from impurities. White glistening cliffs or crags, consisting of the same material, are seen along the banks of the Huallaga.

Coal, also, is said to have been discovered within these two provinces of Brazil.

Articles of Export.—The principal articles of export are India-rubber, cocoa, Brazil-nuts, piassava, cotton, balsam of Copaiba, sarsaparilla, rice, anatto, and hides. Besides these, also smaller quantities of cravo, copal-gum, isinglass, tonquin-beans, tapioca, horns, bones, puxiry, and tobacco appear amongst the exports. A very good quality of yellow cinchona is found in this and the adjoining province; but the bark is not collected, and therefore it does not enter into commerce. Excellent vanilla, too, abounds in the forests, choking the shrubs over which it clammers with its wild luxuriance, but this produce also is wholly neglected. Innumerable medicinal plants, preparations from which are very costly in Europe, are strewn over the whole face of the country, but they are unnoticed.

India-rubber (Seringa or Caoutchouc†).*—Although the exportation of cocoa has been more considerable than that of india-rubber as to quantity, india-rubber may properly be termed the staple article of export, because not only is its value greater, but until recently it was the distinguishing production of this territory, in comparison both with the rest of South America and with the whole world. The discoveries of large quantities of india-rubber in the East Indies, and chiefly in Malacca and the off-lying islands (from a different plant); the rapid improvement in its manipulation, and increase in its exportation to Europe; the subsequent elaboration of the same product in Central America, (where, however, it had been discovered even before this territory was explored by Europeans,) though in small quantities; the same discovery and elaboration on the western coast of South America; (as about Guayaquil,) and, lastly, the more recent discovery and elaboration of caoutchouc, of very superior quality, on the coasts of Africa; all these circumstances have stripped the india-rubber trade of Para not only of its importance, but of its distinctness also. This result, which may, perhaps, change the course of commerce in this district, was due to an exuberance of prosperity. The multiplicity of inventions for the utilisation of india-rubber, which were practically applied since 1848, both in Europe and in the United States, has created an increased demand for the raw material. Mr. T. Hancock, of Manchester, and Mr. Goodyear, of the United States, were rivalling each other in manufacturing ingenuity and were being multiplied by a host of imitators, all of whom became consumers of caoutchouc. Mr. Goodyear then discovered the universalising process of vulcanisation (as it is termed), whereby the uses of this product were endlessly increased. The dealers, stimulated by an unwonted and seemingly insatiable demand, entered into a wildly speculative competition in purchasing at Para, which commenced in 1853, and attained its culminating point in 1854. The same stimulus impelled others to seek for new sources of supply in other parts, where the climate and botanical characteristics favoured the probability that such supplies would be obtained. In the meanwhile, the importations into Europe from Singapore, of a rubber of inferior quality truly, but which served many of the purposes of manufacture, and which was at first introduced at about one-fifth the price of that from Para, had considerably stanchd the consumption; wherefore Para rubber, bought in this market at 2s. 8d. per lb., (the average value in England being about 1s. 8d.) resulted in such losses as reduced the value of rubber at Para, step by step, to a parity with the real value of the article in Europe and the United States. That the consumption of india-rubber is likely to be yet more increased by its being used in a vulcanised state to make the washers of machinery, to line steam boilers (as a preservative, and even, perhaps, (as has been proposed) to the inside lining of ships, and to many other purposes requiring the employment of large quantities, is doubtless true. It is also true that the elasticity and toughness of the

rubber depend greatly upon the manipulation of the milk, and, amongst other things, upon the process of smoking over a fire fed with the nuts or kernels of the Urucuri palm; but the virgin forests of Western Africa are as rich and interminable as those of this country, and all the appliances are at hand there, as here, for proper manipulation, whilst the inferior qualities of rubber, which contribute to the bulk of the consumption, are to be obtained in greater abundance in British India than here. It is the product from the *Iatropa elastica* (here called the Seringa tree), which is the best, and this tree is as much indigenous to Western Africa as to the watershed of the Amazons. A tree called here the Mangabeira, also yields a milk concreting into a rubber of inferior quality; and an attempt has been made at Ceará to establish a competing supply of rubber derived from that tree. But, as this rubber can only be available for the purposes to which the Singapore rubber (obtained from a parasitic or bind-tree, or that of the Burrampooter (obtained from the Banyan), is equally applicable,—that attempt resulted in disappointment; because, owing to the listlessness and indolence of the people of this country, they can only be roused to action by the stimulus of some extraordinary advantage;—wherefore, there is either little or no efficient labour, or it must needs be very costly. Already the Seringals (Seringa woods, or sites for the collection of rubber in this province) were well-nigh deserted by the settlers of the interior, during the latter part of the past dry season (1856), because rubber had fallen to 16 or 17 milreis the arroba at Pará; whereas other articles (of consumption), whether native or foreign, had rather advanced than retrograded in price. And the Indian is not fond of working at any time, but he is still less so when he fancies he is working only for the advantage of the dealer who receives his produce. It is therefore not unlikely that the supply of rubber in this market will in future be scanty, unless there should be a great fall in the prices of all other articles on the one hand (which appears improbable), or a great rise in the price of rubber (which also appears improbable), or, again, a sudden immigration of energetic foreigners,—which is, perhaps, the most probable contingency. If elaborated, the supply is inexhaustible, because the area over which the Seringa trees abound is immense, and because the method of collecting the milk by tapping, practised here, does not destroy the tree, like the Malay fashion of hewing down the Gutta-Percha tree. The Seringa tree here, after being well tapped, and apparently spent for a time, revives and yields again, after a respite of two or three seasons. For the purpose of waterproofing, in which impermeability alone is essential (and not elasticity), the milk can be used, and has been used, without smoking; that is before it is concentered; although, even when so used, it is better for being smoked, to carry off its naturally fetid smell (and which it loses in the artificial drying process). For this application a demand was springing up in the United States, it having been discovered that the milk could be kept liquid by being put into bottles, with a very small quantity of liquor ammoniac, and hermetically sealed. In 1854, a sample of fifty-four arrobas of rubber milk, so preserved, was exported to New York. But hereupon the provincial government of Pará took alarm lest, if this application were continued, the whole supply of the country should be exhausted, the employment afforded by the manipulation at the Seringals should be put an end to, and distress should be brought upon the working population; reasons, neither of which had the least foundation. Wherefore a measure was immediately passed through the provincial legislature, imposing a prohibitory duty on the exportation of the liquid milk. Formerly all, or nearly all, of the india rubber met with in this country was already fashioned, either into the form of rude bottles, or shoes, &c. The latter were freely exported (chiefly to the United States) for use; but the former were mostly cut up. Now the best rubber is mostly smoked upon narrow boards, which mould it into oblong cakes, wholly

* Portuguese name.

† Native Indian name.

free from impurities, and very convenient for packing. The exportation of rubber shoes, which formerly met the bulk of the demand, has gradually dwindled into insignificance, having been superseded by the supply of superior articles made in Europe and in the United States. There are in this country four qualities of concreted rubber, the three first of which are smoked, and the last of which is unsmoked, consisting of that which concretes, either owing to rain falling into it (whereby it is precipitated), or owing to delay in manipulating. These four varieties are known by the names of fine, medium, and coarse *Boracha*, and *Sernamby*.

Cocoa.—Until very lately *Pará* cocoa was very generally and deservedly despised, because it was always in such bad condition. Carelessly gathered and cleared from the pulp, —very partially dried at best, and often cast into heaps and left to heat, before it was sent down from the interior to this port,—then as carelessly thrown into the bottoms of leaky boats, and, even when here, stored without proper hand-picking and drying,—it was very commonly musty before shipment. The great demand created in France during the late war to supply the large military contracts naturally directed the attention of buyers to this port, where, in consequence of the above-named circumstances, cocoa could be purchased for less than one-half the price demanded in the West Indies. The consequence has been that, even in 1855, and still more in 1856, much greater attention was paid to the collection and treatment of the cocoa; and what between its superior condition, an active demand, and a supply rendered scanty by a foregoing season of drought, it has latterly risen to more than three times its former price.

Brazil Nuts.—The collection of Brazil nuts employs the settlers of the interior (who are engaged during the dry season in collecting rubber) during the rains, when *Bor-racha*, or smoked rubber, cannot be prepared, because the rain water falling into the milk concretes it before it can be collected at the working shed of the *Seringeiro*.

Rice, Cotton, Coffee, Sugar, and Piassava.—The production of rice, which might be abundant, especially in this province, of which so vast an area consists of low, level islets, abundantly irrigated, is neither considerable nor carefully conducted. In fact, no produce which requires attention and tillage has yet obtained much consideration from the settlers of this country, who, finding *mandioca* in the woods, and fish in the ever-recurring *plexus* of rivers and creeks, prefer to live upon these rather than to exert themselves to procure aught else. This remark applies as well to cotton and sugar as to rice; and if there be a little more attention paid to the sugar cane in some places, it is owing to the demand for rum; for there is so little sugar made, that, although a very small quantity still appears in the catalogue of exports, the actual consumption is now really supplied from the province of Pernambuco chiefly. The excuse for the suspension of sugar making (for mills are not wanting) is that this requires much labour, and that, especially since the cholera season of 1855, hands are very scarce. Yet, over the greater part of this province there are advantages presented for the cultivation of the cane and the making of sugar which cannot be rivalled in the world; and, amongst others, there is a perfect security against the injurious effects of droughts. As to cotton, it is well known that to be successfully grown it requires cultivation and attention, whereas in this district it merely runs wild. The coffee which is produced here is also left in a state of nature, or nearly so. The chief show of cultivation consists in the occasional clearing away of large timber trees, so as to let air and sunshine in upon the coffee trees. The quality of the produce is not naturally bad, but the total neglect in which it grows affords it little chance of competing with the produce of countries in which it is carefully tended, either in quality or quantity. Nor is the quantity collected sufficient to supply the consumption, which, like that of sugar, is chiefly fed from Pernambuco. Coffee has not yet become an article of export; and sugar, of which there was a trifling

exportation up to 1853, has almost ceased to be despatched to foreign markets. *Piassava*, which is a species of reed-fibre, is almost exclusively used in this country to make a rough but durable species of rope, resembling that made of cocoa-nut fibre, except that it is of a darker colour. This rope resists the destructive effect of moisture and sun-heat better than any other, and is the only material which will endure either for hawsers, cable, or standing rigging, in this climate. *Piassava* is mostly exported for brush-making; and during the transit it serves as dun-nage.

Hard Woods and Dye Woods.—Although there is no manufacture of any consequence from these valuable products, and no exportation of them at all, it were a serious omission, in speaking of the productions of *Pará* and the Amazons, to pass over these without a brief notice. There are more than 18 varieties of cabinet woods, of the most beautiful grain and hues, many of which grow in the form of huge timber trees, and some of which are more enduring than stone. There are also several dye woods which yield imperishable colours to the most obdurate fibre.

Home Correspondence.

STEERING OF STEAMERS.

Sir,—Mr. Leigh is perfectly correct when he states that a vessel, propelled either by paddles, oars, or screws, will invariably turn on its centre when its propellers, of whatever kind, are moved in contrary directions; and if Mr. Knox doubts the truth of mechanical science, he has only to step into the first pair-oar boat he comes across, pull one oar and push the other. The practical proof would soon convince him that the boat, when so managed, can do no other than turn slowly upon its own centre.

Mr. Knox further proceeds to argue that, if practicable and useful, the invention would long since have been adopted by both the shipbuilders and the Government, while it is notorious that manufacturers never avail themselves of new inventions not their own, they having a mortal horror of any change that might possibly imply some increase of trouble and expenditure, until compelled to do so by the power of public opinion.

The case of the Government authorities is still worse—they never adopt a new idea until it has been drilled into them for a series of years, and then, when they do happen to take up some novelty, they engage in it by wholesale, while the invention may perhaps be in its infancy, and thereby cut themselves off from any ulterior improvement, by amassing an enormous stock on hand of an inferior description.

We have two cases in point at the present time—the Enfield rifle, and the Armstrong gun, to both of which arms there are others much superior.

The Enfield cannot compete with several other rifles, and Signor Cavalli's breech-loader cannon is very far in advance of anything Sir W. Armstrong has yet produced.

I do not agree, however, with Mr. Leigh in supposing for a moment that steering by the rudder can ever be dispensed with in plain sailing or steaming, but his mode of disconnecting and reversing the motion of the two paddles or the two screws will be found a most powerful and essential auxiliary in all difficult cases, and more especially in every species of naval warfare.

I am, &c., HENRY W. REVELEY.

Nov. 16, 1861.

Sir,—Your correspondent, Mr. James Knox, criticises my letter on the above subject in a manner which compels me to explain one fact, which he denies, and another which he says he does not understand, viz.:—In the case of the *John Bartlet*, which was run down off Holyhead, the first reports stated that the steersmen were confused,

which caused the accident; but the evidence on the inquest contradicted this, and it was admitted that the helmsmen on both sides did their duty. The thing he does not understand, viz., "how a vessel can be made to turn round in the water without moving an inch forward," seems plain enough. Any one getting into a boat with two oars, and working them in contrary directions, with equal power, will find that the boat will not move an inch forward, but simply spin round. So with steamers.

It is idle to talk about the precise facts as regards the *John Bartlet*, since such accidents, more or less disastrous, are almost of daily occurrence, and keep increasing from year to year, as our commercial rivers and seas get more crowded, and our steamers are built larger and larger, and more than ever unmanageable in that respect. My object in first writing to you was to point out a great and growing public evil, which must be remedied on commercial, humane, and defensive grounds. On commercial and humane grounds because of the disasters that are constantly and increasingly occurring, the annual catalogue of which is frightful; as bearing on our national defences, because a vast amount of public money is now being spent in vain.

In the report of the trial trip of the *Warrior*, just ended, it is stated that it required 19 minutes to wear her, with a great strength of men at the wheel, and only 15 minutes to wear the *Revenge*, her companion (a lighter vessel). Of course this is only another illustration of my first assertion, that large masses of matter in motion cannot be turned out of their course suddenly by a small power at the helm.

Although "not exactly engaged in nautical matters," for the last 30 years I have had something to do with machinery, during which I think I have solved many difficult mechanical problems, and therefore do not believe in any of the difficulties which are stated to impede the accomplishment of this object.

There are several other things I have noticed about ships so quaint, and ill adapted to the purpose they are intended to serve, that, verily, they seem to have been copied from Noah's ark. I am, &c.,

EVAN LEIGH.

Manchester, Nov. 19th, 1861.

Proceedings of Institutions.

FARNHAM YOUNG MEN'S ASSOCIATION. — On Friday evening, November 1, the Lord Bishop of Winchester, President of the Association, presided at the lecture delivered by the Rev. J. S. HOARE, on "Geology in its relation to Scripture," and, after the lecture, announced the following annual statistics, which had been prepared by the Secretary, and which his lordship considered very satisfactory:—During the session 1860–61, fifteen meetings had been held, at which 2,922 persons attended, or an average of 195 to each lecture. The receipts of the session had been—for admission of non-members, £18 13s.; ditto, labouring classes and domestic servants (at 3d. each), £1 13s. 9d.—total, £20 6s. 9d., and this with a rapidly increasing list of members, who are admitted free. During the last month no fewer than thirty-five new members were admitted. The expenses of the session had been—printing and posting lecture bills, £8 8s. 3d.; postage, £2 11s. 6d.; gas and firing, £3 7s. 1d.; (incidentals)—for furniture, &c., £6 12s.; at lectures, £6 1s.—total, £26 19s. 10d. Library and reading-room: issue of books during the past year—tales, 2,068 vols.; biography, 479; travels, 472; poetry, 372; works of reference, 340; history, 254; essays, 219; miscellaneous, 130; science, 99; divinity, 84; natural history, 66—total, 4,523—an increase on the previous year of 861 vols. There were also issued 1,150 monthly parts of serials. The library now numbers 1,306 vols. The sum of £98 14s. 11d. had been expended on the library and reading-room during the

year, out of a total income of £141 16s. 1d., of which sum £35 went to the purchase of new and second-hand books.

MEETINGS FOR THE ENSUING WEEK.

- MON. ...Architects, 8. Mr. Wyatt Papworth, "On the Superintendents of English Buildings in the Middle Ages; Collections for an Historical Account of Masons, their Customs, Institutions, &c.
Ethnological, 8.
Medical, 8½. Dr. F. W. Mackenzie, "Application of Pathological and Physiological Inferences to the Prevention and Cure of Phlegmasia Dolens."
- TUES. ...Civil Engineers, 8. Mr. J. Bailey Denton, "On the Discharge from Underdrainage, and its Effects on the Arterial Channels and Outfalls of the Country."
Ethnological, 8. 1. The Right Rev. the Bishop of Labuan, "On the Dyaks or Aborigines of Borneo." 2. Mr. E. B. Taylor, "On the Languages of the West part of North America."
Photographic, 8.
- WED. ...Society of Arts, 8. Capt. William C. Phillpotts, R.E., "On the Building for the International Exhibition of 1862."
Geological, 8. The Rev. O. Fisher, A.M., F.G.S., "On the Bracklesham Series of Deposits."
Pharmaceutical, 8.
- THURS. ...Antiquaries, 8½.
Chemical, 8. 1. Dr. Oppenheim, "On the Camphor of Peppermint." 2. Mr. G. C. Foster, "On Piperic and Hydroperic Acids." 3. Prof. Bolley, "On some Physical Properties of Tin-Lead Alloys."
Linnæan, 8. 1. Mr. J. D. Macdonald, R.N., "On a New Genus of *Tunicata*, occurring on one of the Bellona Reefs." 2. Mr. J. Couch, "On the occurrence of the Crustacean (*Scyllarus Arctus*) in England."
Royal, 8½.
- FRI.Archæological, 4.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, November 22nd, 1861.]

Dated 13th July, 1861.

1766. F. Tolhausen, 35, Boulevard Bonne-Nouvelle, Paris—Imp. in looms for weaving ribbons and other fabrics. (A com.)

Dated 20th July, 1861.

1832. J. Platt and J. Buckley, Oldham—Imp. in machinery for spinning and doubling cotton and other fibrous materials.

Dated 6th August, 1861.

1952. F. Tolhausen, 35, Boulevard Bonne-Nouvelle, Paris—Improved mechanical contrivances increasing the effect of motive power. (A com.)

Dated 26th August, 1861.

2126. F. Tolhausen, 35, Boulevard Bonne-Nouvelle, Paris—A new kind of artificial fur to be made by means of the Jacquard or other loom, with silk or other textile material. (A com.)

Dated 20th September, 1861.

2356. G. Roberts, 28, Bessborough-place, Pimlico, and F. Lambe, Cushion-court, Old Broad-street—Certain imp. in lamps and lamp wicks, whereby they are adapted for more effectively burning animal, linseed, and other heavy and also glutinous and bituminous oils, and other burning fluids employed for illuminating purposes.

Dated 8th October, 1861.

2506. A. Ford, Battersea—An improved method of forming water-proof fabrics by combining paper with woven or spun fabrics.

Dated 10th October, 1861.

2527. W. J. Williams, Warnford-court—An improved process of charging illuminating gas with the vapour of the hydruret of carbon, for the purpose of increasing its illuminating properties.

Dated 12th October, 1861.

2553. R. C. Furley, Edinburgh—An imp. in coating pills for rendering them tasteless.

Dated 21st October, 1861.

2624. E. Oldfield, Salford—Imp. in self-acting mules for spinning and doubling.

2629. W. Winniatt, Bristol—Imp. in machines for kneading dough.

Dated 22nd October, 1861.

2638. F. O. Ward, 6, Hertford-street, Mayfair—Imp. in hydraulic presses, and in the machinery and apparatus appertaining thereto and requisite in working the same, part of such imp. relating to the pumping machinery attached to hydraulic presses, and this part being applicable to pumping machinery employed for other purposes.

Dated 25th October, 1861.

2667. E. S. Tucker and F. E. Manners, 1, Red Lion-court, Fleet-street—Imp. in the construction of revolving and moveable surfaces applicable to the exhibition of advertisements, show cases, transparencies, and other like matters at fixed stations.
2676. J. B. Schalkenback, Treves, Rhenish Prussia—A new kind of keyed musical instrument, combining the effects of percussion instruments, or the effect of trumpets, and similar instruments, with the effects of ordinary keyed instruments.

Dated 26th October, 1861.

2685. J. Sidebottom, Harewood, near Mottram, Cheshire—Certain imp. in machinery for making partial tubes for the spindles of spinning and other machines.

Dated 30th October, 1861.

2717. R. R. Priestley, Glasgow—Imp. in the manufacture of woven fabrics.
2725. W. Cook, Beaufort-villas, Brixton, and H. Cook, Manchester—Imp. in printing telegraphs.

Dated 31st October, 1861.

2734. J. A. Fanshawe and J. A. Jaques, Tottenham—Imp. in the means of securing the doors of railway carriages.

Dated 1st November, 1861.

2740. E. A. Maling, 25, Whitehead's-grove, Chelsea—Imp. in glass cases for the cultivation of plants and flowers.
2743. B. Mitchell, Greenwich, Kent, and W. Brunt, Penge, Surrey—Imp. in the construction of scissors and shears.

Dated 2nd November, 1861.

2752. J. S. Brooks, 1, Cambridge-villas, Mare-street, Hackney—A new or improved back or chest protecting brace or braces.

Dated 4th November, 1861.

2767. J. Stewart, Glasgow—Imp. in the manufacture of cards for jacquard weaving. (A com.)
2771. J. Ashley, 13, Grosvenor-place, Bath—Imp. in apparatus for attaching horses to carriages.

Dated 5th November, 1861.

2772. R. Wilson, Patricroft, near Manchester—Certain imp. in steam hammers, and in valves applicable to the same and to other steam engines.
2773. J. Livesey, Manchester—Imp. in apparatus for communicating from one part of a railway train to another, and for coupling pipes.
2774. E. Brooks, Birmingham—An imp. or imps. in the manufacture of bayonets.
2775. W. Hall, Calais, France—Imp. in the production of curved and other forms in articles of lace.
2776. C. F. Hayes, Royal Small Arms Factory, Enfield—Imp. in means or apparatus for generating steam.
2777. R. Fethney, Manchester—Imp. in machinery or apparatus for preparing, spinning, or doubling cotton, silk, and other fibrous materials, parts of which imps. are applicable for winding and other purposes.
2778. R. A. Brooman, 166, Fleet-street—Imp. in steam generators, and in furnaces for the same. (A com.)
2779. E. Bowra, Upper Norwood, Surrey—Imp. in the manufacture of elastic fabrics.
2780. J. B. Love, Philadelphia, U.S.—Imp. in the mode of combining together and securing to the sides of navigable vessels and water batteries armour plates of iron or steel.
2781. J. P. Bourquin, Newman-street, Oxford-street—Imp. in ornamenting the covers of photographic albums, books, writing cases, and other like articles.
2783. H. Orth, Wissenbourg, France—An improved soap.
2784. G. T. Bousfield, Loughborough-park, Brixton—Imp. in electroplating or depositing metals. (A com.)

Dated 6th November, 1861.

2785. G. Davies, 1, Serie-street, Lincoln's-inn—Imp. in fire-arms and ordnance. (A com.)
2787. A. Prince, 4, Trafalgar-square, Charing Cross—Imp. in furnaces for reducing zinc ores. (A com.)
2788. W. Ramsell, Deptford—Imp. in the construction of boats, barges, buoys, and other like structures of metal, and in machinery employed therein.
2789. F. H. Schroder, Hampstead—Imp. in evaporating and in machinery employed therein.

Dated 7th November, 1861.

2791. S. Cockett, Blackburn—Imp. in cop tubes.
2722. J. Walmesley, New Acerrington, Lancashire—Imp. in looms for weaving.
2795. J. R. Wigham, Capel-street, Dublin—Imp. in apparatus for the manufacture of gas, parts of which are also applicable for cooking purposes.
2796. S. Lepard, Cloak-lane—Imp. in apparatus for heating and warming conservatories, greenhouses, ferneries, orchard houses, or other buildings and rooms.
2798. H. G. Gibson, Mark-lane—Imp. in apparatuses for drying hops, malt, grain and other vegetable substances, part of which is applicable as a fan or blower. (A com.)
2799. J. Hancock, Nottingham—Imp. in the manufacture of looped fabrics, and in machinery to be employed therein.
2800. W. A. Shepard, Pall-mall—Imp. in preparing and treating gutta percha and india rubber.
2801. J. Barrow, Dalton Chemical Works, West Gorton, near Manchester—Imp. in the manufacture of benzole, naphtha, naphthaline, aniline, and carbolic acid.

Dated 8th November, 1861.

2803. B. Dobson and J. Clough, Bolton-le-moors—Certain imp. in machinery for combing, preparing, and spinning cotton and other fibrous substances.
2806. J. Tyler, 62, Pratt-street, Camden-town—Imp. in the manufacture of clarionets.
2807. W. Clark, 53, Chancery-lane—Imp. in railway signal apparatus for the prevention of the collision of trains. (A com.)
2809. J. Byrne, Whitehouse, Antrim—Imp. in machinery or apparatus for scutching and refining flax, hemp, jute, and other fibrous substances.

Dated 9th November, 1861.

2812. M. Morgan, Wellington-street, Strand—An improved gaiter or covering for the leg.
2813. G. Simpson, Glasgow—Imp. in boring apparatus such as is used for mining purposes.
2814. R. McNair, Glasgow—Imp. in casings for stitching machines, and in adapting the same for writing.
2818. S. W. Campain, Deeping Saint Nicholas, Lincolnshire—Imp. in apparatus for stacking straw and other agricultural produce.
2819. R. A. Brooman, 166, Fleet-street—Imp. in obtaining alkaline phosphates. (A com.)
2820. R. A. Brooman, 166, Fleet-street—An improved spinning toy. (A com.)
2821. E. Loyse, Cannon-street—Imp. in match-boxes or cases.
2822. W. E. Newton, 66, Chancery-lane—Improved apparatus for manufacturing and containing gaseous liquids. (A com.)
2823. A. Turner, Leicester—Imp. in knitting machinery.
2824. W. Clark, 53, Chancery-lane—Imp. in portable and other filters. (A com.)

Dated 11th November, 1861.

2828. G. Leslie, the Mall, Hammersmith—Imp. in pen and writing instruments.
2829. W. Clark, 53, Chancery-lane—Imp. in safety lamps. (A com.)
2830. J. J. Shedlock, Weir-dale-villas, Earl's-court, Kensington—Imp. in gas meters.
2831. G. F. Wilson and G. Payne, Sherwood Works, Battersea—Imp. in treating fatty and oily matters.
2833. C. O. Crosby, Bridge-street, Blackfriars—Imp. in the manufacture of pointed trimming, and in the machinery for manufacturing pointed trimming.

Dated 12th November, 1861.

2836. J. Davidson, Leek, Staffordshire—Imp. in apparatus for communicating between the passengers and the guard and engine driver of a railway train.

PATENTS SEALED.

[From Gazette, November 26th, 1861.]

November 23rd.	
1307. J. Hynam.	1356. W. Bywater.
1314. C. Batty.	1358. W. Hunter.
1315. B. Collingham & M. Mason.	1359. H. B. Mackay.
1318. G. Herbert.	1362. F. Tolhausen.
1323. W. Roberts.	1363. E. C. Healey.
1325. E. Green and J. Cadbury.	1366. P. Cameron.
1328. M. De Albytre.	1372. R. Wilson.
1333. W. N. Nicholson.	1374. J. Taylor and R. King.
1337. G. W. Rendel.	1378. F. N. Gisborne.
1338. R. M. Letchford.	1379. R. C. Ransome.
1340. H. Crichtley.	1382. W. A. Shepard.
1342. J. Halliwell.	1486. M. Henry.
1347. W. P. Savage.	1496. S. B. Singer.
1351. T. Y. Hall and J. Stockley.	1518. J. Knowles.
1353. A. Blake.	1522. W. and J. Todd.
1354. A. Oudry.	1584. J. Fletcher & J. W. Fuller.
1355. L. Heinemann.	1576. A. V. Newton.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID, AND DATES OF THEIR PRODUCTION FOR CERTIFICATE.

[From Gazette, November 22nd, 1861.]

November 18th.		2662. R. H. Hughes.
2638. W. Lea.		November 20th.
2653. T. Spencer.		
2654. W. Ralston.		2650. S. W. Johnson and J. Varley.
2661. W. Warne, J. A. Jaques, and J. A. Fanshawe.		2656. W. Gorman.
November 19th.		2787. J. Jobson.
2640. H. Jordan.		

[From Gazette, November 26th, 1861.]

November 21st.	
2696. J. Ramsbottom.	2695. J. Tangye.
November 22nd.	
2681. C. Mather.	2676. C. Coates.
	2668. C. Peterson.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID, AND DATE OF THEIR PRODUCTION FOR CERTIFICATE.

[From Gazette, November 22nd, 1861.]

November 20th.	
2343. J. Betteley.	
[From Gazette, November 26th, 1861.]	
November 21st.	
2525. J. Whitworth.	November 22nd.
	2512. S. Smith.

Journal of the Society of Arts.

FRIDAY, DECEMBER 6, 1861.

VISIT OF THE SOCIETY TO THE EXHIBITION BUILDING.

By the courtesy of Messrs. Kelk and Lucas, the contractors for the building now in course of erection for the International Exhibition of 1862, the members of the Society of Arts were invited to inspect the works, on Saturday last, the 30th ult. Each member had the privilege of introducing a friend, and, notwithstanding the unfavourable state of the weather, about one thousand persons were present.

Lieut. Brooke, R.E., who has been for some time past engaged in assisting the architect, Captain Fowke, R.E., in the superintendence of the works, kindly accompanied the Chairman of the Council and other members over the building, explaining its most interesting features.

This visit was arranged principally with the view of giving additional interest to the paper read by Captain Phillpotts, R.E., at the meeting on Wednesday evening.

Those members who were prevented from visiting the building on Saturday last, can use their cards of admission on any subsequent Saturday afternoon previous to the 1st of February, 1862.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £440,250, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The Thames Iron Company are proceeding rapidly with the Eastern Dome, but their exertions seem to have stopped their operations on the Northern Courts, the roofs of which they have contracted to fix. It is not clear why they do not employ twice the number of hands. As respects the Western Dome, the contractors have taken the matter up so energetically, that they speak very confidently of the work being completed at the time appointed for the delivery of the building into the hands of the Com-

missioners. The forests of timber conceal the real progress of the domes, and until these are quite finished, the scaffolds cannot be removed. The contractors are making preparations to work by gas light. The glazing of the south courts is making the utmost progress, and will be finished in a few days, but some delay in the glazing may occur in reference to the northern courts, unless the iron work goes on more rapidly.

In all other respects the works are proceeding with an activity that promises an easy fulfilment of the contract. The plastering of the Picture Gallery east of the entrance will be completed this week, and it is fully expected that the whole of the scaffolding will be removed from the Picture Galleries before Christmas.

The late rains have rendered the state of the ground very dirty, but the drainage, which was necessarily delayed till all the heavy ironwork was brought in and fixed, has now been commenced, and will be finished in a few days.

The flooring of the ground floor is about to be commenced in some parts, but it may be doubtful if it should be carried throughout the whole building until after the heavy goods of the Exhibition have been brought in and the foundations made. A great amount of damage was done to the floor in 1851 by the reception of goods, and also in Paris in the "annexe." The reception of goods does not commence until the 1st of March, and it will therefore rest with the Commissioners to say if they will have the whole floor laid by the 12th of February, the day for delivering up the building.

The refreshment contracts have been given in two blocks, the one to Mr. F. E. Morrish, of Liverpool, and Mr. W. Sanders, late of the Great Western Hotel; the other to M. Veillard, of 59, Mark-lane, and M. Martin, of Paris, supported by MM. Valentin, the great wine merchants, in that city. There are two separate contracts. Although they vary somewhat in their details, the principle adopted is the same in both, of paying a per centage on the visitors. Both contractors pay down a premium. Besides, in the French contracts, it is said that the contractors will pay $\frac{1}{2}$ d. per visitor on the first four millions of visits, and a farthing upon all exceeding that number. The English contractors, it is said, are to pay something like five-eighths of a penny on every visitor. It is estimated that, should the numbers be the same as in 1851 (about six millions) the funds of the Exhibition will receive about £30,000. It forms no part of the contract with Messrs. Kelk and Lucas that the refreshment rooms should be delivered up on the 12th of February, but they are making arrangements to complete the works as soon after that date as possible.

The following additional arrangements have been made:—

Her Majesty's Commissioners have requested the Earl

of Caithness; E. Kater, Esq., F.R.S.; and Hugh Diamond, Esq., M.D., to act as a Committee in connection with the Photographic Department.

ROME.

A Commission has been appointed here, consisting of the following members:—Sua Eccellenza il Signor Principe Aldobrandini, Presidente:—

Sig. Cav. Luigi Tosi, Sostituto del Ministero; Sig. Cav. Luigi Grifi, Segretario Generale del Ministero e Segretario della Commissione; Sig. Cav. Tommaso Minardi, Ispettore delle pitture pubbliche di Roma; Sig. Commend. Pietro Ercole Visconti, Commissario dell'Antichità di Roma; Sig. Commend. Pietro Tenerani, Direttore dei Musei, Gallerie Pontificie; Commend. Luigi Paletti Cattedratico di Architettura nell'Accademia di S. Luca; Sig. Commend. Clemente Falchi, membro emerito, del Consiglio d'Arte; Sig. Cav. Francesco Podesti, Cattedratico di pittura nell'Accademia di S. Luca; Sig. Cav. Gio. Batt. De Rossi, membro della Commissione Consultiva di Antichità e belle Arti; Sig. Conte Virginio Vespiniani, membro della Commissione Consultiva, di Antichità e belle Arti; Sig. Prof. Niccola Cavalieri S. Bertolo, membro del Consiglio di Arte; Sig. Presidente della Primaria Camera di Commercio di Roma; Sig. Vice-Presidente, idem; Sig. Giuseppe Gigli, membro della Commissione di Agricoltura; Sig. Prof. Clemente Jacobini, idem; Sig. Cav. Gioacchino Albertazzi, idem di Commercio; Sig. Cav. Luigi Vescorali, idem d'Industria; Sig. Prof. Francesco Ratti, idem; Sig. Prof. Giuseppe Ponzi, idem.

THIRD ORDINARY MEETING.

WEDNESDAY, DEC. 4TH, 1861.

The Third Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 4th inst., Henry Thomas Hope, Esq., Vice-President of the Society, in the chair.

The following candidates were proposed for election as members of the Society:—

Anstie, Alfred	55, Lincoln's-inn-fields, W.C.
Beeton, S. O.	248, Strand, W.C.
Birkin, Richard, jun.	Nottingham.
Clarke, Robert, G.	St. Alban's-road, Highgate, N.
Cutler, Joseph Horatio ...	New Town-row, Birmingham.
Devey, Joseph	Lewes, Essex.
Dixon, George	Broad-street, Birmingham.
Dunning, Joseph Wm. ...	{ 1, Field-court, Gray's-inn, W.C.
Finlayson, John Sterling	{ 14b, Weymouth-street, Port-
Hamilton Bruce	land-place, W.
Frauenknecht, Oscar	Bangor House, Shoe-lane, E.C.
Hanrote, Philip Augustus	{ 8, Ladbroke-square, Notting-
	hill, W.
Horton, Isaac	{ New Park-st., Borough, S.E.,
	and 16, Clapham-rise, S.
Hunter, Edward	The Glebe, Blackheath, S.E.
Jackson, Edward E.	49, Rathbone-place, W.
Lamb, George	{ Worting, near Basingstoke,
	Hants.
Lea, John Wheelley.	68, Broad-street, Worcester
Manning, John	Nottingham.
Payne, Joseph	Highgate, N.
Reid, John	{ 5, Langford-place, Lansdown-
	road, St. John's-wood, N.W.
Scott, Charles A.	24, Ely-place, Holborn, E.C.
Underdown, Emanuel	{ Gray's-inn-square, W.C.
Maguire	
Vaughan, Henry	{ 28, Cumberland-terrace, Re-
	gent's-park, N.W.
Waugh, Edgar Weller ...	3, Goodge-street, W.

Williams, Thomas.....	{ Pembridge - gardens, Bays-
	water, N.
Yeo, Frank Ash.....	{ Belvoir-villas, St. Helen's-
	road, Swansea.

The following candidates were balloted for and duly elected members of the Society:—

Adams, Thomas.....	Lenton Firs, near Nottingham.
Adcock, Wm. Thompson.	Worcester.
Ainslie, Wm. George ...	Ford House, Ulverston.
Alcock, Henry	36, Stockwell-park-road, S.
Atkin, Harry Wright ...	{ 39, Ely-place, Holborn, E.C.,
	and Truro Works, Sheffield.
Austin, George	7, London-street, E.C.
Baily, John Walker	71, Gracechurch-street, E.C.
Baker, William	Euston Station, N.W.
Banbury, Frederick	46, Westbourne-park-road, W.
Barnes, John Hickman ...	6, Fitzroy-square, W.
Barrett, Henry	Beech-street, Barbican, E.C.
Barrow, Wm. Hodgson, } M.P.	Nottingham.
Bass, Michael Arthur ...	Burton-upon-Trent.
Batters, George	{ 8, Elm-grove, Peckham-rye,
	S.E.
Bazalgette, John Van Nor-	{ 1, Delahay-street, Westmin-
den	ster, S.W.
Beale, Willert.....	28, Grosvenor-street, W.
Beisly, Sidney	The Cedars, Laurie - park,
	Sydenham, S.E.
Bellamy, Alan Charles	{ 10, Cornhill, E.C., and Streat-
Bruce	ham, S.
Belt, Thomas.....	Ryton, near Newcastle-on-
	Tyne.
Bennett, John	{ 50, Westbourne-park - villas,
	Bayswater, W.
Bentall, Edwd. Hammond	{ Heybridge, near Maldon, Es-
	sex.
Benyon, Richard	{ 34, Grosvenor-square, W., and
	Englefield House, Reading.
Berners, Lord	Keythorpe Hall, Leicester.
Birkbeck, George H.	{ 34, Southampton-buildings,
	W.C.
Birkin, Richard	{ Appley Hall, near Notting-
	ham.
Birly, Richard.....	{ Seedley, Pendleton, Manches-
	ter.
Bischoff, James	72A, Old Broad-street, E.C.
Black, Henry, jun.....	1A, Berners-street, W.
Bone, Geo.	44, Minories, E.C.
Boord, Joseph.....	{ 14, Upper Hyde-park-gardens,
	W.
Boord, Thos. Wm.	{ 7, Greville-road, Kilburn,
	N.W.
Booth, Edwin.....	Barnsley.
Boreham, Wm. Wakeling,	{ Haverhill, Newmarket.
F.R.A.S.	
Bradley, John.....	The Park, Nottingham.
Brakell, Thos.....	Cook-street, Liverpool.
Breffit, Edgar	61, King William-street, E.C.
Brogden, John	4, Highbury-park North, N.
Brooke, Thos.....	{ Northgate Mount, Hudders-
	field.
Brown, M. L.....	47, St. Martin's-lane, W.C.
Brownfield, Wm.	{ Chatterly - house, Hanley,
	Staffordshire.
Browning, Thomas.....	6, Whitehall, S.W.
Brunswick, Myrthil	{ 26, Newman-street, Oxford-
	street, W.
Burt, Stephen John	26, Faringdon-street, E.C.
Candy, Charles	{ 4, 5, and 6, Watling-st., E.C.
	and Wellfield, Streatham.
Carstairs, Peter	The Green, Richmond, S.W.
Carter, Edwin Jones	{ 3, Watling-street, E.C., and
	Upper Homerton, N.E.
Chaplin, R. J.	17, Red-cross-square, E.C.

Chapman, Wm.....	Nottingham.	Finnis, Thos. Q., (Alder- man)	79, Great Tower-street, E.C.
Chappell, Thomas.....	50, New Bond-street, W.	Firmin, Geo. J.	Atlas Chemical Works, Boro'- road, S.E.
Chatteris, Henry	The Grove, Lee, Kent	Fischer, John Phillip ...	Tower-street, E.C., and Pebble Combe, Epsom.
Chatto, John	Royal College of Surgeons, W.C.	Fisher, Joseph Chas.	3, Cripple-gate - buildings Wood-street, E.C.
Clark, Hy., M.D.,	Southampton.	Fisher, James.....	Radford Works, near Not- tingham.
Clarke, Robert	London Coffee House, Lud- gate hill, E.C.	Forster, Geo. Baker	Newcastle-upon-Tyne.
Clay, Richard.....	Bread-street-hill, E.C.	Foster, Sampson Lloyd .	The Five Ways, Walsall.
Clennell, John Edward....	London-fields, Hackney, N.E.	Franklyn, George Wood- roffe, M.P.	Lovell-hill, Windsor.
Clifford, Charles.....	5, Hare-court, Temple, E.C.	Fuller, Wm. Moxon	Grimstone-cottage, Wolver- hampton.
Cobden, George Long ...	13, Leonard-place, Kensing- ton, W.	Fulton, J. Rennie	34, Duke-st., St. James, S.W.
Collard, Charles L.	Oval-road, Regent's-park, N.W.	Gerstenberg, Isidor	11, Warrford-court, E.C.
Cooper, George Binion ...	121, Drury-lane, W.C.	Glass, Thomas	24, Somerset-street, Kings- down, Bristol.
Cooper, Henry.....	20, Moor-street, Soho, W.	Goode, Thomas.....	19, South Audley-street, W.
Copeland, Alfred J.	Manor - house, Bushy, and 160, New Bond-street, W.	Goodwyn, Major-Gen. H. }	4, Blomfield-terr., Harrow- road, W.
Cossham, Handel	Shortwood-lodge, near Bristol	Graham, Alexander	South - fields, Wandsworth, S.W.
Couchman, Henry	Elm-cottage, Lee-road, S.E.	Graham, William	Manchester.
Cowtan, Maiver.....	23, Sheffield-terrace, Camp- den-hill, W.	Grant, George	59, Oxford-street, W.
Collett, Charles	90, Cannon-street, E.C.	Grew, Frederick	8, Leighton-vils. Holloway, N
Cory, William, junr.'.....	4, Gordon-place, W.C., and Coal Exchange, E.C.	Gunter, Richard.....	East Hill, Wandsworth, S.W.
Cox, Wm. Thos.	Spondon Hall, near Derby.	Guy, George	6, Powis-pl., Haverstock-hill' N.W.
Crawley, Charles Edward	17, Gracechurch-street, E.C.	Hallett, George.....	52, Broad-wall, Blackfriars, S.
Cullingford, W. H.	7, Phillimore-gardens, Ken- sington, W.	Hallilay, Richard	5, Sergeant's Inn, Temple, E.C.
Curtis, Thomas	The Hall, Berkhamstead.	Halloran, Arthur B., }	9, Regent - park, Heavitree, Exeter.
Darton, J. M.....	58, Holborn-hill, E.C.	Hankey, Blake Alex. ...	38, Portland-place, W.
Davidson, Adam.....	The British Linen Company Bank, Nairn.	Harrison, Thos., jun., B.A. }	17, Clarendon-road, Kensing- ton, W.
Davies, Henry	21, Duncan-ter., Islington, N.	Harris, James	Hanwell, W.
Davy, Charles.....	Gwynne House, Woodford Bridge, and 100, Upper Thames-street, E.C.	Harpley, Matthew John ..	Royal Regt., of Horse Guards.
Dawson, John.. ..	New Park-road, Clapham- park, S.	Headley, Richard	Stapleford.
Day, C. A.	Northam Iron Works, South- ampton.	Hebbert, Charles	12, Ovington-terrace, Brompt- on, S.W.
Deed, Martin	451, Oxford-street, W.C.	Hely, Francis Edward ...	1, London-street, E.C.
Dennett, Chas. Cotton ...	Nottingham.	Hemming, Fred. Shand...	Belsize-pk., Hampstead, N.W.
Denton, Chas. Jones	5, Clarendon-terrace, Bow- road, E.	Hennet, Follett Charles...	Bridgewater.
Dewsnap, W.....	7, and 57, St. John's-square, E.C.	Herbert, Wm. (Messrs. Symes and Co.).....	33, Fenchurch-st., E.C., and Rectory Grove, Clapham, S.
Dixon, James	22, Tavistock-square, W.C.	Hester, John Cooks	14, Little Tower-street, E.C.
Dodson, Henry	Cambridge Lodge, Penge-rd., Sydenham, S.E., and 98, Blackman-st., Borough, S.	Hewett, Henry John ...	19, Alexander-square, Brompt- on, S.W.
Donald, Thos. W.....	69, Regent-street, W.	Hill, James Duke	25, Coal Exchange, E.C.
Dowell, Wm.....	14, Bexley-place, Greenwich, S.E.	Hill, Thomas Rowley ...	Catherine-hill House, Wor- cester.
Dowie, James.....	455, Strand, W.C.	Hindley, Chas. Hugh ...	134, Oxford-street, W.
Driver, Henry	Windsor.	Hinstin, Ernest	22, Milk-st., Cheapside, E.C.
Duncan, James	Greenock.	Hitchcock, Frs. Maunder.	Southmolton, Devon.
Dunsford, Wm. James ...	14, Taviton-street, Gordon- square, W.C.	Hodge, Charles	Oak-lane, Limehouse, E.
Durlacher, Alex.	15, Old Burlington-street, W.	Hunt, Richard	Scarborough, Yorks.
Eborall, Cornelius Willes.	2, Lee-park, Blackheath, S.E.	Hutchinson, John Henry.	19, Little Pulteney-street, W.
Espin, John	Davies-st., Berkeley-sq., W.	Hutchinson, John	Appleton Lodge, Warrington, Lancashire.
Evans, E. Bickerton	Worcester.	Hunting, Richard	139, Regent-street, W.
Evans, Robert Harding ...	73, Warwick - square, Bel- gravia South, S.W.	Hyde, Edmund	Kingston-on-Thames, S.W.
Farden, Richard.....	5, Queen's - row, Turnham- green, W.	Ingram, Alexander	Stranraer, Wigtownshire.
Farnecombe, Chas.	19, Culford-road, North Kings- land, N.E.	Ingle, Henry	102, Shoe-lane, E.C.
Farrow, Chas.	18, Great Tower-street, E.C., and Holly-lodge, Wood- street, Walthamstow, N.E.	Jackson, Edward	Rochford Bank, Rochford.
Feversham, Lord	1, Great Cumberland-st., W.	Jacob, Edward	4, City-road, E.C.
Filmer, Thos. H.	28, Berners-street, W.	Jarvis, John Stephen.....	47, Tufnell-park - road, Hol- loway, N.
		Jellicoe, Charles	23, Chester-terrace, Regent's- park, N.W.
		Jenkins, Chas. Fredk. ...	9, Sunderland-terrace, West- bourne-park, W.
		Joel, Joseph	Brompton-hall, S.W.

Johnson, Charles	{ 10, Addison-road, Kensington, W.	Oram, Richd. E. Sprague	1, Bellevue, Stalybridge.
Jonas, Samuel Adolph ...	2, Bow-lane, E.C.	Paget, Frederick	37, Old Broad-street, E.C.
Jones, Edward	{ The Larches, Handsworth, Birmingham.	Paget, Thos. Tertius ...	Humberstone, Leicestershire.
Jones, Frederick John ...	10, Aldermanbury, E.C.	Palmer, George	Reading.
Joske, Paul	Baron House, Mitcham, S.	Pares, John	{ Elm-grove, Binfield, Berks and Prescott Manor, Banbury.
Kennedy, Chas. Burton...	Fairview, Ulverston.	Parker, Henry T.	{ 8, Ladbroke-grdns., Kensington-pk., Notting-hill, W.
Kennedy, Myles	{ Burton-cottage, near Ulverston.	Parker, James	{ Gt. Baddow-house, Chelmsford, Essex.
Kershaw, Joseph Goodwin.	Mordon-rd., Blackheath, S.E.	Palk, Sir Lawrence, Bart., M.P.	Haldon-house, Exeter.
Kirk, Alfred	Horncastle.	Pease, Henry	Pierpoint, Darlington.
Kyle, John Joseph J.....	Bogle-street, Greenock.	Pease, Joseph	Southend, Darlington.
Lascelles, Francis	{ Oakhill - park, Hampstead, N.W.	Peterkin, James Grant . .	Grange-hall, Forres, N.B.
Leeks, Mrs. E. F.	73, Warwick-square, S.W.	Phillip, George	32, Fleet-street, E.C.
Lelean, William	{ 21, Queen's-road West, Regent's-park, N.W.	Phillips, Robt. Needham	The Park, Manchester.
Lennox, Lord Henry Gordon, M.P.	51, Portland-place, W.	Phillips, Thomas Adams	Gibson-square, Islington, N.
Lethbridge, J. C.	25, Abingdon-street, S.W.	Phythian, T.	430, West Strand, W.C.
Lewenz, Ivan	23, Fenchurch-street, E.C.	Pitman, Frederick	20, Paternoster-row, E.C.
Lewis, John	{ 46, Guildford-street, Russell-square, W.C.	Pittar, Park... ..	16, Kensington-pk.-gdns., W.
Loam, Matthew	Liskeard, Cornwall.	Pocock, Samuel John ...	{ 6, Woburn-place, Russell-sq., W.C.
Loam, Michael, jun.	Liskeard, Cornwall.	Poole, H. G.	4, Old Burlington-street, W.
Lock, Sam. Robt.	{ 9, Bernard-st., Primrose-hill, N.W.	Prothero, Francis Egerton, B.A.	The Inner Temple, E.C.
Lucas, Alfred	Luton Bank, Luton.	Pryor, Francis	Redruth, Cornwall.
Lucas, James J. H.	{ 13A, Upper Woburn-place, Tavistock-square, W.C.	Pursell, Alfred	80, Cornhill, E.C.
Maclaren, George	{ 5, Cursitor-street, Chancery-lane, E.C.	Puttick, James Fell	47, Leicester-square, W.C.
McCorquodale, George ...	Newton, near Warriington.	Reuter, Simon	{ Moorgate-st. Chambers, Moorgate-street, E.C.
McClean, Frank	{ 2, Park-street, Westminster, S.W.	Reynolds, Chas., Wm....	2, Eaton-place, S.W.
McClure, William	Manchester.	Ricardo, David	{ Gatcombe, Minchinhampton, and 29, Piccadilly, W.
McKewan, William	21, Lombard-street, E.C.	Richardson, T. Shepherd	{ Clapham-house, Litlington, Sussex.
Marshall, James.....	{ 11, Vere-street, Oxford-street, W.	Richards, Wm.	{ 16, River-street, Myddleton-square, E.C.
Marston, Henry	94, Albany-street, Regent's-park, N.W.	Rider, Samuel C.	{ 3, Albion-villas, Tollington-park, Hornsey-road, N.
Martin, Geo. W.	14 and 15, Exeter Hall, W.C.	Ringland, William	36, Wood-st., Cheapside, E.C.
Martin, Peter, J. P.	{ The Street, Rivington Chorley, Lancashire.	Roberts, Daniel	{ 16, Northampton-place, Old Kent-road, S.E.
Masset, Alfred Moyse ...	13, Sanford-place, Stoke Newington, N.	Roberts, Henry	{ 32, Arlington-street, New North-road, N.
Masson, Francis John ...	53, Bolsover-street, W.	Robinson, J. H.	The Grove, Petworth, Sussex.
May, Geo. B.	Truro.	Roe, George	Nutley, Dublin.
Mayhew, Chas. Fredk. ...	{ 10, Barge Yard - chambers, Bucklersbury, E.C.	Rogerson, John	{ Newcastle-on-Tyne, 2, Royal Exchange-buildings, E.C., and Killingworth - house, Northumberland.
Melles, William	11, Alwyne-road, Canonbury, N.	Rolls, R. H.	Banbury.
Metzler, G. T.	{ 35, 37, and 38, Great Marlboro'-street, W.	Rowland, Alexander W.	20, Hatton-garden.
Meyerstein, Wm.	9, Highbury-grove, N.	Rubens, Victor	{ 1, Angel-court, Throgmorton-street, E.C.
Miller, Geo. James	6, Great College-street, Westminster, S.W.	Rumbold, William Henry	The Grange, Tunbridge Wells.
Morel, Victor	9A, King Edward-street, Lambeth-road, S.	Ryan, James, J. junr.	116, Long-acre, W.C.
Moreton, John	22, Bush-lane, Cannon-street, E.C., and Wolverhampton.	Schlesinger, Julius.....	{ Walmer - villa, Bradford, Yorkshire.
Morrish, F. E.	Lancaster - buildings, Liverpool.	Shaw, Benjamin.....	8, Cambridge-square, W.
Murchison, Sir Roderick L., D.C.L., F.R.S., &c.	16, Belgrave-square, S.W.	Shepperson, Allen Thos.	Dulwich-hill, Surrey, S.
Murray, Thos.	12, Copthall-court, E.C.	Sheriff, Robert French ...	{ 14, Jermyn-street, S.W., and Inner Temple, E.C.
Myers, Abraham Nathan .	144, Leadenhall-street, E.C.	Shirreff, Geo. W.	4, Bank-chambers, E.C.
Navroji, Dadabhai	32, Great St. Helen's, E.C.	Sidebottom, Alfred.....	Crown-street, Camberwell, S.
Negroponte, Stavros J. ...	{ Edge-lane, Stretford, Manchester.	Silk, Robert, junr.	8, Long-acre, W.C.
Neighbour, Geo. L.	127, High Holborn, W.C.	Simons, George	The Park, Nottingham.
Neilson, Walter Montgomerie	Hyde-pk. Locomotive Works, Glasgow.	Simonsen, Michael L. ...	35, Finsbury-circus, E.C.
Nichols, Richard Peter ...	25, Maida-hill West, W.	Simpson, Wm. Fred.....	456, West Strand, W.C.
North, Thomas	Basford-hall, nr. Nottingham.	Skey, George	Bonehill-lodge, Tamworth.
		Smith, David	109, Fore-street, E.C.
		Smith, F. Warwick	{ 180, Upper Thames-street, E.C.
		Smith, Hy. Nickison.. ...	{ 2, Compton-road, Canonbury, N.

Smith, James	Barton-villa, Malton.
Smith, R. M.	Edinburgh.
Snelgrove, John	11, Vere-st., Oxford-st., W.
Snowden, Thomas	Stockton-on-Tees.
Sparrow, Charles E.	11, New North-street, Red Lion-square, W.C.
Sparrow, Wm. Mander ...	Penn-court, near Wolverhampton.
Spooner, William	Walton-lodge, Stafford.
Square, Elliot	16, Notting-hill terrace, W.
Stenhouse, John, LL.D., F.R.S.	17, Rodney-street, Pentonville, N.
Stone, David H.	33, Poultry, E.C.
Stovin, The Rev. Charles Frederick	Leigh-hill, Cobham, Surrey.
Tansley, Alfred John ...	Luton, Beds.
Taylor, T. G.	10A, King's Arms-yard, E.C.
Taylor, Wm.	Sunny-field, near Braintree, Essex.
Thompson, H. Ayscough	On the Bank, Highgate, N.
Toms, Thos. Harris	Higham Lodge, Walthamstow, N.E.
Tongue, John Garrett ...	34, Southampton-bdgs., W.C.
Toogood, Henry	1, Chester-square, W.
Tredinnick, Richard	Mildmay-park, N., and Lombard-street, E.C.
Treggon, Wm. Thos.	22, Jewin-street, E.C.
Treloar, Thomas	42, Ludgate-hill, E.C.
Turner, Benj. Brecknell..	31, Haymarket, S.W.
Turton, Thomas	Portwood, Stockport.
Tyler, Sir Jas.	Pine-house, Holloway, N.
Tyson, John	Manchester.
Unna, Ferdinand.	Vernon-lodge, Addison-road, Kensington, W.
Utterton, Rev. Jno. Sutton (Archdeacon of Surrey)	Farnham, Surrey.
Vallance, H. Wellington.	3, St. George's-road, Ecclestone-square, S.W.
Vallentin, James	Shearn-lodge, Walthamstow, N.E.
Waggett, John, M.D. ...	Stanley - terrace, Kensington-park, W.
Walker, Sir Edwd. S. ...	Berry-hill, Mansfield, Notts.
Walsh, David H.	Pembroke-house, Pembroke-road, Clifton, Bristol.
Wardell, Wm.	Abbotsfield, Chester.
Watkins, William	52, Lime-street, E.C.
Watson, Peter	71, Myddelton-square, E.C.
Watts, Robt.	6, Great Newport-street, W.C.
Webb, Chas. Locock.....	Hanover-terrace, Notting-hill, W.
Webb, George (Messrs. Symes and Co.)	33, Fenchurch-street, E.C., and 2, Middleton - road, Dalston, N.E.
Wells, George	12, North-street, Westminster, S.W.
Wheelwright, Wm., jun.	16, Upper Woburn - place, W.C.
Whitfield, Geo. C.	1, Cambridge-place, Kensington, W.
Williams, Dr. Llewellyn.	9, Leonard-place, Kensington, W.
Wilson, Chas. Edmund...	5, Earl's-terrace, Kensington, W.
Wilson, Erasmus, F.R.C.S., F.R.S.	17, Henrietta-street, Cavendish-square, W.
Wilson, Robert Porter ...	31, Threadneedle-street, E.C.
Wilson, William	18, Ludowick-terrace, Gloucester-road, N.W.
Winsor, Wm., F.C.S. ...	38, Rathbone-place, W.
Woolton, Chas.	246, Boro' High-street, S.E., and Lynton-lodge, Clapham-park, S.
Young, John, Jun.	35, King-street, E.C.; and 47, Mark-lane, E.C.

The Paper read was—

THE BUILDING FOR THE INTERNATIONAL EXHIBITION OF 1862.

BY CAPTAIN WILLIAM C. PHILLPOTTS, R.E.

The records of this Society show that, in establishing the International Exhibition of 1851, it was intended it should be the first of a series of similar Exhibitions; its brilliant success confirmed the Society in this resolution, and ten years was thought to be a convenient interval between each.

Accordingly, in 1858, the idea of an Exhibition, to be held in 1861, was brought forward, and being favourably received, was resolved on. The political state of Europe, however, compelled its postponement till 1862, and a Royal Commission for carrying it out was appointed early in the present year.

The surplus funds of the 1851 Exhibition had been devoted to the purchase of a plot of ground on the Kensington-gore Estate, which was intended to aid future International Exhibitions and buildings for promoting Industrial Science and Art. Twenty-two acres of this ground have been enclosed in a large quadrangle formed by arcades, and leased by the Commissioners of 1851 to the Royal Horticultural Society to promote the objects of that Institution.

In laying out the arcades a large piece of ground was left at the south end, and the possibility of future Exhibitions not being lost sight of, they were so arranged as to make the remaining unoccupied space easily available for that object.

The southern portion of the arcades was built from the design of Captain Fowke, the engineer and architect to the department of Science and Art, who was one of a Committee appointed to superintend the construction of the whole of the works on the estate of the Commissioners of 1851. From having been Secretary to the British department of the Paris Exhibition, in 1855, he had gained a clear insight into the nature of the building best adapted to a similar Exhibition in England. Availing himself, therefore, of the experience thus gained, and acting under the conviction that periodical International Exhibitions would be established in England, he carefully considered the most appropriate design for a building on the ground adjoining the Royal Horticultural Society's Gardens. This design was matured while the arcades were in progress, and was therefore ready to be submitted to the Royal Commissioners as soon as they were appointed.

On the arrangements for the ground being completed, the Commissioners therefore had before them a design founded on a large experience and an intimate knowledge of the site, the merits of which they at once recognised. Thus relieved of the necessity of competition, which, in the case of the 1851 Exhibition, resulted in disappointment and delay, they carefully considered Captain Fowke's plans, and eventually accepted them, subject, however, to some modification on account of the cost of their execution, which was estimated at £590,000. The leading feature of the original design was the Great Hall, two interior views of which, by Mr. Godfrey Sykes, are before you. It was to have been 500 feet long, 250 feet wide, and 210 feet high. Its proposed position was immediately behind the central entrance of the south front, above which it would have towered in solitary grandeur. It was, however, suppressed on account of its cost; but there will be no architectural or constructive difficulties in adding the Great Hall subsequently, and it is to be hoped that before another Exhibition is held, sufficient funds for it may be available.

The first drawings to which I wish to draw your attention, are those illustrating the progress of designs for Exhibition buildings. Most of you are aware that the invitation of the Commissioners for competitive plans for the 1851 Exhibition was responded to by 280 designs.

Many of these gave proof of great skill and ingenuity on the part of their authors, but not one of them was thought to be perfectly adapted for the purpose. A Committee for all matters relating to the building, composed of some of the leading architects and engineers of the day, was nominated, and they prepared a plan which was, in a great measure, a combination and modification of the most meritorious designs furnished by the competitors. You have a drawing of this before you. It was actually determined on by the Committee, and very nearly carried out, but the popular outcry against it was so strong, that the Commission was glad enough to give it up at the last moment, to consider the happy suggestion of Sir Joseph Paxton, which they ultimately adopted, and the beautiful Crystal Palace (now removed, with some alteration, to Sydenham) was the result. This, as it appeared in 1851, you will at once recognise among the various drawings submitted to your inspection. Four years later came the Paris Universal Exhibition, of which you will also see a drawing of the permanent portion now remaining, to the same scale as that of 1851; and, finally, we have several beautiful views, prepared by some of the leading artists of the day, of our building as it will appear next year; I need not enumerate them, the various points from which they are taken being marked against each.

THE SITE.

You will better understand a description of the site by observing the plan of it, which is before you. The ground on which the main building stands is about 16 acres in extent, and occupies the southern portion of the land purchased at South Kensington by the Commissioners for the Exhibition of 1851. Nearly rectangular in shape, it measures about 1,200 feet from east to west, by 560 feet from north to south. It is immediately south of the Royal Horticultural Society's gardens, the southern arcade of which has been lent to the Exhibition for refreshment rooms. The Cromwell-road forms the southern boundary; on the east it adjoins Exhibition-road; and on the west, Prince Albert's-road.

The whole of this ground will be covered by buildings of a permanent character, and, to secure as much additional space as possible, the two long strips of ground between the east and west arcades and the adjacent roads will be roofed in by means of temporary sheds, to give ample space for the exhibition of machinery and other ponderous objects, which cannot be conveniently shown in the main building. The additional area afforded by these two annexes will be about seven acres, which will make the total extent of the Exhibition 2½ acres.

The general level of the ground is from four to six feet below the adjoining roads, and it has a gentle slope from north-east to south-west. The nature of the soil is well adapted to building purposes; a bed of gravel, from four to twelve feet from the surface, extends throughout the whole area, so that a dry and firm foundation is easily obtained.

The Commissioners for 1851 are the legal proprietors of the site, but to secure the greater portion of it for the intended 1872 Exhibition, they have agreed to reserve about 16 acres of it for that purpose on receiving £10,000 as a sort of ground rent. It is already agreed that to this Society will be granted the lease of the central portion of the Picture Gallery, one acre in extent, along the Cromwell-road, for 99 years, on condition that ground-rent to the amount of £240 per annum be paid to the 1851 Commissioners, it being understood that it will be given up unreservedly for the use of the 1872 Exhibition.

Unlike the 1851 Exhibition, therefore, the removal of which was compulsory, all that foresight could suggest has been done to retain the present buildings, and there can be no moral doubt that if, by any possible means, sufficient funds are available to meet the pecuniary liabilities, they will remain.

GENERAL DESCRIPTION.

In the general design of the building, a large ground-

plan of which is before you, its suitability for future International Exhibitions has been kept steadily in view, and it has a much more permanent character than the famous Crystal Palace erected for the 1851 Exhibition.

It differs therefore from its predecessor in many essential particulars. It is more commodious, more imposing in its interior, more varied, more suitable for Exhibition purposes, while from without its aspect is of impressive magnitude and grandeur.

Here glass and iron are no longer the main features of the design, but are succeeded by lofty walls of brickwork, which surround the ground on all sides, and form the walls of the fine arts galleries. The east end and west sides, by being continued past the southern arcade of the gardens, have a frontage of 750 feet, and that on the south is 1,150 feet. The north front is the lower arcade of the gardens, which is having a permanent upper story added to it. The interior space thus enclosed is entirely covered in by roofs of various heights, and is divided into nave, transepts, aisles, and open courts; the latter, occupying comparatively a very small portion, are roofed with glass as in 1851, but the other parts have opaque roofs, and are lighted by clerestory windows.

The interior supports are hollow cast-iron columns, as in 1851, of somewhat larger dimensions, being a foot wide, with half an inch of metal in them. They are so arranged as to come at intervals of 25 or 50 feet from centre to centre; in fact, 25 is the unit here as 24 was in 1851, and you will find nearly all the leading dimensions, both vertical and horizontal, to be multiples of that number. The exceptions to this rule are the nave and transepts, which are 85 feet wide; the former runs east and west, and terminates in the centre of those fronts, having its central line 81 feet north of the centre line of the building; the latter extend north and south from the ends of the nave throughout the whole width. At the intersection of the nave and transepts are the great domes. The aisles are continued all round the nave and transepts, and the space enclosed by them forms the open or glass courts.

The columns are supported differently from what they were in 1851. On that occasion they were attached to connecting pieces, which, terminating in a large flat base plate, rested on concrete laid flush with the ground; these connecting pieces of course varied in height to suit the slope of the ground. This has been avoided in the present building by bedding the columns themselves on York slabs laid on brick piers, which are founded on concrete; the slabs being all adjusted to the same level throughout by varying the height of the brickwork, only one length of column is used, and the facility of setting them up is thus greatly increased.

At the north ends of the east and west fronts are the two annexes, temporary, supplementary structures, designed for the exhibition of machinery and other ponderous objects, which could not be conveniently placed in the main building.

The total area roofed in is 988,000 square feet; it is therefore, considerably larger than the 1851 Exhibition, which only occupied 799,000 square feet. It has also, when actual covered space is alone considered, slightly the advantage of the Paris Exhibition, which had a covered area of 953,000 square feet. But if we compare the total space, covered and uncovered, occupied by each, Paris is considerably larger, for the better suitability of its climate for out of door display enabled the authorities of that Exhibition to increase the area of ground given up to exhibiting space by 547,000 square feet, while, with our variable climate, it has not been thought advisable to have more than 35,000 feet of ground unroofed; so that the total areas, covered and uncovered, occupied by the two Exhibitions, are 1,500,000 square feet for Paris, and 1,023,000 square feet for 1862.

The French Exhibition, therefore, considerably exceeded ours in size, but it was not nearly so compact in form, and its temporary annexes made up a very large portion of it,

occupying 600,000 of the 953,000 square feet, while our two annexes do not amount to more than one-third of the total area.

I have prepared a diagram, showing the size of these three structures reduced to squares, which will show you at a glance the relative proportions of each.

CONTRACT.

Before going into a more detailed account of the various parts thus generally described, it is desirable to state the means which Her Majesty's Commissioners have adopted for the punctual completion of this stupendous building. The plans were submitted to the competition of ten leading contractors; three tenders were sent in, and that furnished by Messrs. Kelk and Lucas being the lowest, was accepted.

These two most eminent firms, joining their resources together, have become partners for the work, and if one can judge from their antecedents, a better guarantee for punctuality and sound work could hardly have been obtained.

The nature of the contract is peculiar. The whole responsibility for the execution of the works rests with the contractors, and the amount they are to receive is contingent on the receipts of the Exhibition. The Commissioners have the option of purchasing the building out and out, or of merely paying for the use of it. For the rent of the building, a sum of £200,000 is guaranteed absolutely; if the receipts exceed £400,000, the contractors are to be paid £100,000 more for rent, and they are bound, if required, to sell the whole for a further sum of £130,000, thus making its total cost £430,000.

The date agreed upon for the building to be completed and given up to the Commissioners is the 12th of February next, and although even now it is impossible to say, with certainty, whether that date will be rigidly adhered to, yet it is certain that, provided no unforeseen accident occurs, the stipulated time will be very nearly kept. Ample opportunity will thus be afforded for completing the arrangements of the interior by the 1st of May, on which day it will be opened to the public.

SOUTH FRONT.

The general outline of the south front presents an elevation 1,150 feet long, and 55 feet high in the brickwork, with two projecting towers at each end, rising 16 feet above the general outline, and a larger tower in the centre, in which is to be the main entrance to the Picture Galleries. Semicircular headed panels, separated by pilasters, are built at central intervals of 25 feet throughout the whole length, a high plinth extends all round, and between the arches are circular niches, at present vacant, but admitting of future decoration. In the lower portion of each panel is a window, to admit light and air to the ground floor, and for ventilation of the Picture Gallery above.

The exterior is chiefly in plain brickwork, and with no more ornament than that work admits of. The panels are plastered in cement, and experiments are proposed to ornament them in English mosaics. The exterior decoration will eventually depend on the way in which this is carried out, to be decided as funds become available; the present Exhibition will be quite incomplete in this respect, but any amount of architectural ornament that can be paid for may be added hereafter. Yet, in spite of this want of ornament, the author of the design has succeeded, with comparatively very limited means, in producing a very imposing general effect.

Those who have become acquainted with the leading features of the Exhibition building, chiefly through the earlier published drawings, will perhaps be surprised at my describing the south, or principal front, without touching on the great domes, which, according to those drawings, form so important a feature in it. But the fact is that these domes, being 300 feet from this front, can never, in any way, enter into its effect; so far from it indeed, that from no possible position, can they ever be seen at the same

time as part of the general front. The error has evidently arisen from the circumstance of the drawings in question having been made up by persons ignorant of the plan of the building, from geometric elevations, in which, of course, the domes appeared as if they belonged to the south front. I am induced to allude to this from the fact that much hostile criticism has been wasted upon the disastrous effect of the domes, as seen from positions, from which they are really invisible. Each dome keeps its place as the centre of its own front, and its effect is utterly independent of its fellow, which is 1,000 feet from it. To this want of comprehension of the subject may be attributed the feeling that has been expressed against the two domes adopted, and in favour of a central one. It will be seen, on a little reflection, that each of the domes is virtually central in its own composition, while a dome in the centre of the whole building would (from the vast extent of the structure and its peculiar situation) have been thrown entirely out of sight on all sides but one, until seen from such a distance as to lose all connection with the building in an architectural point of view. The upper terrace of the horticultural gardens is the only point from which such a dome would have been seen in connection with the building, and this is also the only point from which the two present domes appear simultaneously; but when thus viewed, so completely does the building carry on the symmetrical lines of arcades and terraces, that the duality of the domes is at once accepted as the natural complement of the system which has governed the laying out of the entire quadrangle, namely, that it should be considered with reference to a single building of commanding proportions, situated on the proper site for the chief point of the composition, the most northern and highest part of the ground.

The main entrance to this portion of the building will be through three arches in the central tower, 20 feet wide and 50 feet high, resting on piers 14 feet thick, decorated with terra cotta columns. Above the arches is the cornice and frieze, on top of which, and above the middle porch, is an ornamental clock dial. Passing through the archways, the visitor enters a large vestibule and hall, 150 feet long and 110 feet wide, leading to the Industrial Courts and Galleries. A flight of steps on either side will conduct him to the Picture Galleries, before entering which I shall briefly explain the general principles which have influenced their design.

The chief desideratum of a picture gallery is an equally distributed light throughout, admitted in such a way as will prevent its rays being directly reflected from the surface of the picture to the eye of the visitor. A light, therefore, satisfying this condition, when the observer is standing at a convenient distance, is the only one which can be called perfect.

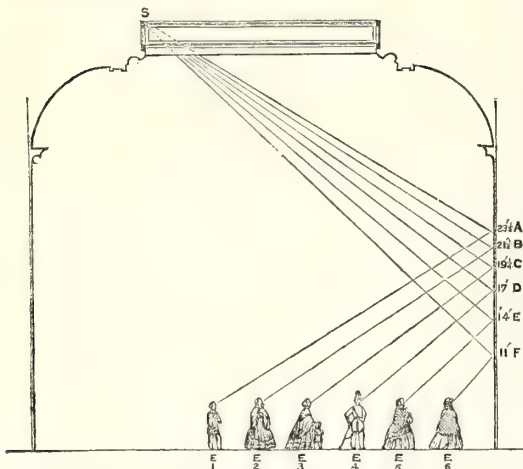
No one can have observed pictures lighted by ordinary windows without experiencing the unpleasant effect produced by the improper reflection of the rays, or glitter from the pictures, as it is called. It is for this reason that one is often puzzled where to find a place from which to see the whole of a large picture to advantage. This defect exists in many of the finest galleries, both in this country and on the Continent, and the result is that some pictures can scarcely be seen at all, while others can only be observed from one or two points, which are always more or less crowded, according to the merits of the subject.

This is obviated by admitting the light at a particular angle from the roof, by means of a skylight extending along its entire length, and which in the present case measures 31 feet in width, that is, 15' 6" from the ridge on either side. The entire width of the opening, measured on a horizontal plane, is 29' 2". As will be seen by reference to the section, each room is 50 feet wide, and at a height of 32' 9", a cove, springing from a cornice on either side, reaches the height of the tie-bar of the principals (42' 10" above the floor), 12' 4" from the wall, thus leaving a space 25' 4" between the coves.

In this space a transparent calico ceiling (hereafter to be replaced by ground glass) is introduced, which, however, is raised 2' 4" above the highest point of the cove, or 45' 7" from the floor. The space between the highest point of the cove and the eave of the calico is occupied by *louvre*s for ventilation.

These proportions will afford the gallery as much light as possible, and glitter from the surface of the pictures will be avoided. As regards the quantity of light admitted, it may be briefly stated that the opening for admission is exactly half the floor area of the gallery, the former being 25 feet wide, the latter 50. In dealing with the quantity of light, another important point must not be lost sight of, namely, the height of the opening from the floor and its consequent distance from the picture. In this gallery this is reduced to a minimum consistently with the avoidance of glitter, being only 45' 7" from the floor.

The following illustration will explain the question of glitter, or reflection of light, from the varnish of pictures:—Supposing a mirror to be hung against the entire surface of the wall. It will be seen, by referring to the diagram, that a ray of light from the skylight, at its extremity furthest from either wall, striking that wall at A, at a height of 23' 3" above the floor, will be reflected so as to reach the eye, at E, of a beholder (say 5' 3" above the floor) standing 5' on the other side of the centre of the room, or 30 feet from the mirror, and consequently all the rays striking below that point will fall below his eye, or, in other words, he will not be able to see the image of the skylight in the mirror at any point below 23' 3" from the floor, and, as a matter of course, there will be no glitter on the wall, or on pictures hung against it, below that point. Consequently, to see pictures without glitter hung higher up, it will be necessary for the spectator to retire still further from the centre of the gallery.



Transverse Section of Picture Gallery, showing the way of admitting the light to avoid glitter.

It will be seen from the diagram that this point, which is called the glitter point, alters with the position of the beholder. For instance, at E, 5 feet from the wall, the glitter point is at F, 11 feet from the floor, while on coming closer it will descend in proportion. On the other hand, by receding to a distance of 10 feet, the wall may be seen without glitter to a height of 14 feet. Looking again to the same diagram, it will be seen that, apart from all considerations of reflection, a person desiring to see a picture at a height of 14 feet, would naturally retire 10 feet, if not more from it, and the same may be said of the other heights and positions shown on the sectional diagram, so that in any position in which a person can conveniently examine a picture, he may be sure of having its surface free from glitter.

This system of lighting increases the difficulty of successfully treating the exterior of the building, for it prevents any windows being placed in the upper part of the side walls, but after the very successful application of these principles of lighting to picture galleries which have been constructed within the last few years at South Kensington, it was wisely determined to forego all other considerations, and apply the same principles to the rooms destined to receive the choicest works of art of the present age.

On ascending the stairs, the visitor enters a vestibule of similar proportions to the one below, from which he obtains one unbroken vista throughout the whole extent of the main gallery, and it is difficult to conceive a finer effect than that produced by contemplating the noble proportions of the rooms before him.

Entering the first on either side, he will find himself in a spacious hall, 325 feet long, 50 feet wide, and 43 feet high. Passing through this, he will enter one of the wing towers, which forms a room 52 feet by 45 feet, and 66 feet high; he will then enter another room 75 feet long, and of the same width and height as the first, from which he will pass into the end tower, whence he will have an uninterrupted view of the whole main gallery.

The interior decorations of these rooms will be very simple, and may be briefly described as a plain cove extending to each side of the skylight, and resting on a moulded cornice.

Arrangements for thorough ventilation, so essential to the preservation of the pictures and comfort of the visitors, are amply provided for, by admitting fresh air through apertures along the floor level, and allowing the vitiated air to escape through *louvre*s in the skylight.

Descending to the ground floor, the same sized rooms are repeated, but as they are lighted by means of ordinary windows they will probably be devoted to other objects than those coming under the head of fine arts. The part of the picture gallery which is to revert to the Society of Arts is the central hall, and the two large rooms, 325 feet long, on either side of it.

Before concluding this description of the Picture Gallery, its constructive details will be interesting. The foundations throughout are carried down to the gravel, here from 6 to 12 feet below the surface of the ground, in concrete, on which ordinary brick footings are laid. In the front wall the piers carrying the semi-circular arches are 12 feet wide, by 3' 2" thick, and the intervening panel having merely its own weight to support, is only 9" work. The back wall is of rather a different construction. This is a plain wall from top to bottom, with numerous arches through it on the ground-floor; it is built for the most part hollow, with piers so placed that the weight of the floor and roof will come on them. This system of hollow walling gives the greatest strength with the least amount of material, and secures a straight face at either side. The floor of the picture gallery has been constructed of great strength, so as to bear with perfect safety the greatest load which can be brought on it. It is carried on girders 13½ by 12, resting on the side walls and intermediately supported by two cast-iron columns. These girders cross the building at central intervals of 12½ feet, and over them are laid joists 11 in. by 2½ in., two feet apart, to carry the floor-boards. A portion of this floor has been proved to 140 lbs. to the foot, which exceeds the greatest load it can have to bear when densely crowded with visitors. The walls in the picture gallery are lined throughout with wood, which is kept at a short distance from the brickwork, so as to guard against damp. The design of the roof is the same as that already employed by Captain Fowke in one of the South Kensington Galleries, and also in the Irish National Gallery in Dublin, and seems well adapted for its purpose; the principals which support it consist of two strongly trussed double timber rafters, connected together by an iron tie bar four feet above the level of the wall plate. The coved ceiling is thus made four feet higher than it

could have been with an ordinary tie-beam roof. As I am not aware that this description of truss is often adopted in a timber and ceiled roof, I am induced to show a drawing of it, as it is of extremely simple construction, and capable of very general application.

The principals are placed at central intervals of 25 feet; they rest on flat stones built into the walls, and strongly trussed purlins, carrying the skylight rafters and upper portion of the cove, are suspended to them. The skylight is glazed with 16 oz. glass, and the rest of the roof covered with slates.

EAST AND WEST FRONTS.

We now come to the east and west fronts, which, though differing from the south, are not less imposing. They are, in all respects, similar to each other in their general effect. Here the stupendous domes, rising to a height of 260 feet, will show to most advantage, and the transept roof, with its lofty clerestory windows, will be in full view. To the observer below, the form of each dome will appear nearly that of a semicircle; this effect is obtained by making its height 11 feet more than its semi-diameter, which will fully allow for the loss by perspective diminution.

From the crown of the dome rises the finial to a height of 55 feet. The dome is in the middle of each façade; its centre is the point formed by the intersection of the centre lines of the nave and transepts, and the front of the building is advanced from it 108 feet. Here, through a noble arched recess, is the main entrance to the industrial courts, the effect of which will, I think, form one of the most pleasing exterior parts of the building. This central porch is 162 feet in extreme width, and contains a deep semi-circular arched recess, of 68 feet span and 80 feet high. It is recessed with a deep covering capable of receiving an almost endless variety of decoration, if such be desired hereafter; while in its present simplicity, it is equally valuable on account of the richness of effect produced by the bold light and shade.

In the tympan of the recess is the great rose window, which will be visible from end to end within, the window in one closing the vista as the spectator looks from a standing point beneath the other. Minor porches on either side, 36 feet wide, forming wings, support a pedimental gable which rises to a level with the ridge of the nave and transept roofs, and is finished with a bold line of balustrade. The entrances beneath are enclosed by an arched framing filling up the recess for one-quarter of its height, and having a balcony above. The flat brickwork of the wings is relieved by pilasters, one on each side of the minor porch; these carry a light cornice moulding, surmounted by an attic.

On either side of the central entrance, recessed 15 feet from it, extend 235 feet to the north and south, the exterior walls of the building; these enclose the auxiliary picture galleries. There is a high plinth from end to end, and immediately above are panels formed by a series of coupled semi-circular arched recesses with bold pilasters between. Over all is an appropriate cornice supported by corbels. By the wall being reduced to a height of 36½ feet, the lofty clerestory windows of the transept which rise immediately behind, come into the composition. As in the south front, the lower portions of the panels are occupied by windows to give light and ventilation to the offices and retiring rooms, with which the ground floor on these sides will be occupied. The upper floor is to be used as an auxiliary picture gallery, and is therefore lighted on the same principles as the rooms on the south front.

A visitor will be able to enter the auxiliary galleries, independent of the main gallery, by means of stairs on either side of the east and west entrances; or he will have access to them from the end towers of the latter, already described. They form four distinct rooms, 247 feet long, 25 feet wide, and 17 feet high. The same principles of lighting and ventilating being observed in these galleries as in the larger one, their construction is similar, subject, of course, to the alterations necessitated by their smaller size.

The main and auxiliary picture galleries of the fine arts department will afford 4,600 lineal feet of hanging space, from 17 to 30 feet high; yet all this amount, large as it may seem, is required, and even more would have been desirable, could it, by any possibility, have been obtained. An idea of their extent may be formed by the fact that in walking once up and down the galleries the visitor will have to traverse a mile all but 60 yards, and presuming the moderate allowance of 75 per cent. of the available wall-space to be actually covered by pictures, their aggregate areas will equal 7,600 square yards, or about 1½ acres!

NORTH FRONT.

To complete our survey of the exterior, we must examine the north front, for which purpose it is necessary to enter the Royal Horticultural Society's Gardens. The large space here afforded admits of a connoisseur criticising it from several points of view. For our purpose, however, it will suffice to imagine our station to be on the central walk, one or two hundred yards from the South Arcade.

From no other point will a better appreciation of the building be obtained. The South Arcade forms the basement of the north front, to which an upper story is now being added. The façade is divided into two floors, except the central portion, which has a mezzanine interposed. The ground floor, consisting of the Southern Arcade of the Gardens, with its pleasing arrangement of twisted terra-cotta columns, is, doubtless, familiar to most of you. The whole front is divided into five faces, in different lines of advance. By subdividing the centre mass into three sections, a very great variety and relief of design is obtained. The middle of the front is occupied by the entrance from the gardens, through three 10-feet ornamented brick archways, supported by coupled stone columns; these are immediately opposite the Southern Entrance, from which point will be obtained one unbroken vista across the whole building up to the cascade and conservatory at the north end of the gardens.

In examining the five divisions of the façade, we find that the centre (70 feet high) presents three levels—the arcade of the gardens—the shallow mezzanine (interrupted by the central arches before mentioned)—and the upper floor. On each side of the centre are the lights of the arcade, consisting of tripled ornamental brick arches, on terra-cotta columns, separated by pilasters; the upper lights are similarly arranged, and the whole is surrounded by a paneled frieze of appropriate design, with openings for ventilation. Over this is seen the roof, of good pitch, following the line of the ground plan.

The two corresponding recesses on each side are thrown back twenty-five feet, and extend in an unbroken line for 200 feet, with a height of 60 feet; the level of the upper floor here corresponds with that of the centre mezzanine, and the lighting, both above and below, is effected by eleven sets of tripled arches, similar to those in the centre division.

At each end are the returns into the garden, and in the fifty feet which completes the length, is an entrance archway, ten feet wide, on the far side of which the tripled arched light is repeated.

The treatment of the whole façade is most effective; much diversity is obtained by the arrangement of the masses; general uniformity is successfully sought, and every part harmonises admirably with the adjoining arcades. At a short distance behind rises the lofty ridge of the nave, terminated at either end by the imposing outline of the great domes.

The upper and lower floors on this front occupy an area of 26,800 square feet; the whole of this space is to be given up to the refreshment rooms and offices connected with them.

A better choice of situation could not have been made. The exhausted sight-seer, surfeited and bewildered by the endless variety of objects furnished by the Exhibition,

will here retire to recruit his mental and bodily vigour for fresh exertions. Here will be retailed refreshments of all kinds—every variety of eatables, from the delicate sponge-cake and strawberry ice to the honest substantial roast beef. The teetotaler will find himself bountifully supplied with waters—aerated, medicated, and pure, too numerous to mention; or, should he be so disposed, he may even indulge in ginger-beer and lemonade, while the more generous liver will obtain anything he chooses to call for—from bitter ale to iced champagne.

Let us glance at the mental refreshment afforded; on ordinary days it will be the quiet contemplation of the fairy-like scene before him; here will the mind feast, while the eye wanders from the sloping green banks, and verdant alleys of the pleasure gardens, studded with flowers basking in the sun, to where the great cascade—appropriate monument to the parent of all around—pours itself into its wide and glittering basin below. On the occasion of *fêtes*, the beauty of the scene will be still further increased by throngs of gaily dressed visitors to the gardens, and the enjoyment of it enhanced by the music provided for their entertainment.

Nor will the pleasure ever be clouded by thoughts of the possibility of these rooms being removed, for no matter what are the financial results of the Exhibition, they, at least, will remain after its close, and form part of the Horticultural Gardens.

NAVE AND TRANSEPTS.

Let us now begin our survey of the interior.

In this it is not my intention to go minutely into the construction of the whole, and I shall only dwell on those parts which present any novelties; the limited time at our disposal necessitates this, and even were it otherwise, it would be unprofitable, for there are certain portions without any claim to novelty, a description of which would be uninteresting, as they differ in no essential point from many ordinary iron structures.

To commence with the nave and transepts, which are similar in all respects.

Entering by the east or west front, the visitor rises two steps, which brings him to the level of the dais under each dome. From this point, six feet above the rest of the floor, he will in one view command the interior of the whole building. A very serious obstacle in the ground has been cleverly overcome by this arrangement. The roads surrounding the site are about five feet above the level of the ground on which the building stands. Had this contour been rigidly followed, the visitor would have had on entering at once to descend five feet.

This immediate descent would have been most inconvenient, and would have totally marred the otherwise imposing interior aspect of the building. Had the whole area been raised to suit the road level, it will be obvious that the cost would have been considerably increased. From the dais three flights of steps, 80 feet wide, conduct the visitor into the nave and transept on either side. The nave is 800 feet long, 85 feet wide, and 100 feet high to the ridge of the roof.

The supports on either side consist of square and round cast-iron columns, coupled together; the former carry the gallery floor, and the latter, advancing into the nave, receives the principals of the roof. These columns are 50 feet high, in two lengths of 25 feet each, and from their capitals spring the roof frames, which consist of three thicknesses of plank, from 18" to 2' 6" deep, firmly nailed and bolted together, and so arranged that their ends break joint. The centre plank is 4 inches thick, and each of the outer ones is 3 inches; the lower edges are tangents to an imaginary semi-circle, round which they form half of a nearly regular polygon. From the springing rise the posts of the clerestory windows, 25 feet high. The principal rafters of the roof frames rise from the top of these posts, and are carried up after passing a tangent to the extrados of the arch to meet at the ridge in a point 25 feet above the top of the clerestory.

The angles over the haunches and crown of the arch are firmly braced together, so as to reduce the thrust as much as possible.

The rib is repeated 30 times in the length of the nave, and from its graceful curve and elegant lightness it produces an extremely fine effect. Between every roof principal is a clerestory light 25 feet high, consisting of three arches springing from intermediate mullions. The roof is covered with felt, on $1\frac{1}{2}$ inch plank, which is laid diagonally so as to brace the whole together. The nave is therefore entirely dependent for its light on the clerestory windows; this is found to be amply sufficient, and a substantial water-tight covering is thus ensured, having the advantage of obviating all chance of that unpleasant glare which the experience of 1851 proved to be unavoidable with a glass covering, while at the same time it will be cooler in summer and warmer in winter. The rain-water from the roof is conducted, by means of gutters, down the columns supporting the ribs to drains laid under the ground floor, which carry it off to the drains under the adjoining roads.

From each end of the nave, at right angles to it, and extending north and south for a length of 650 feet, run the transepts. They are the same width and height as the nave, and the ribs of its roof are of precisely the same construction. This construction will be more fully understood by referring to the drawing, which shows the arrangement of planks and bracing.

The nave ribs have been made at Mr. Kelk's yard in Pimlico, and carted to the ground in four pieces. When on the spot ready for hoisting, they were formed into two pieces so arranged that the point of junction should always be at the ridge. To fix the principals in the nave roof, a moveable scaffold of very clever design was used. A drawing of it, showing its construction, is before you. It contains 4,740 cubic feet of timber, and weighs 87 tons; but, notwithstanding this, it is moved by four men working crabs under the wheels. One half of a rib was first hoisted to its place; when in position, the other half was raised, and as soon as both were fixed true, they were joined together by completing the arch and bracing over its crown. As soon as one rib was up, the travelling scaffold was moved to the adjoining bay, and the next rib completed. The purlins and boarding were then fixed, after which the scaffold was again moved forward, and another bay covered in the same manner.

The hoisting is all done by a most ingenious winch, or hoist, worked by steam, the invention of Mr. Ashton. This machine has two grooved cast-iron barrels, which are made to revolve by means of a system of toothed wheels, connected with a portable steam engine. A rope is passed round the grooves. On the fall being manned, and the barrels set in motion, the coils of the rope are gathered up, and a great hoisting power obtained. By means of snatch blocks and pulleys, ropes are led from this beautifully simple machine to all parts of the building, and the heaviest materials, such as girders, columns, scaffold beams, &c., are hoisted to their position with the greatest ease and rapidity. As an instance, I need only mention that the heavy floor girders, weighing about $1\frac{1}{2}$ tons, were raised in two minutes, columns in about the same time, and the ponderous ribs of the nave, weighing $6\frac{1}{2}$ tons, required only from ten to twenty minutes to raise them their full height.

The only portion of the Crystal Palace of 1851 which can be compared with the nave is the great central transept, whose height was 104 feet, or 4 feet more than that of the nave, but it was narrower by 13 feet, being only 72 feet wide, while the total length of the nave of the present building will be very nearly three times as great.

The ribs of the transept were fixed over a standing scaffold all through, which alone consumed 30,336 cubic feet of timber. The reason for this was that as the domes divide the transepts into four separate lengths, four travellers would have been necessary, and though these would not have taken nearly so much material as the standing scaffolds, yet the contractors thought that the difference

would not have compensated for the additional labour required in building the former.

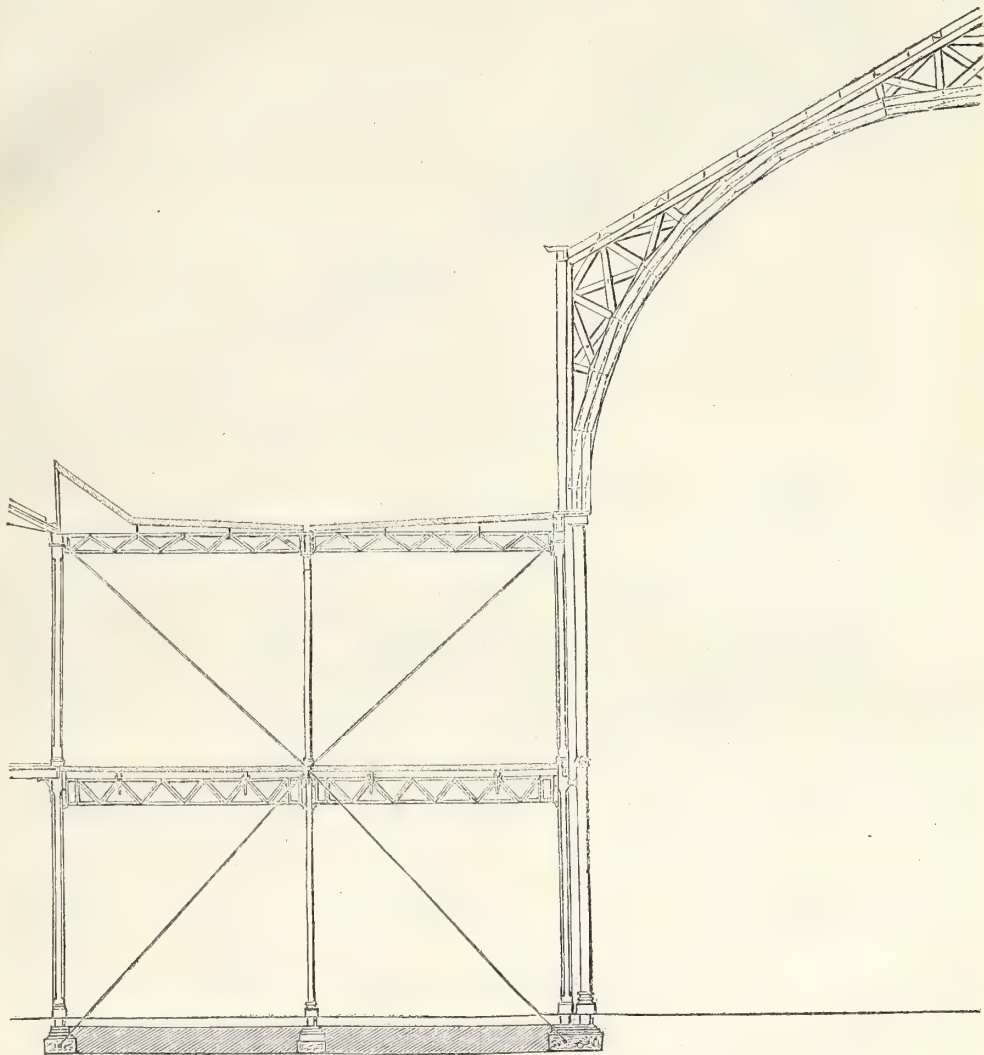
AISES, GALLERIES, AND STAIRS.

By referring to the general plan, you will see that in it are shown three large buildings parallel to each other, the refreshment rooms, the nave, and the picture gallery. These are connected at their ends by transepts, and thus two vast oblong spaces are enclosed, one to the north, and the other to the south of the nave.

On both sides of the nave and the inner sides of the transepts, are aisles 50 feet wide. Another aisle, 25 feet wide, is carried along the outer sides of the transepts and along the back wall of the south front.

After deducting the space occupied by all these aisles from the oblongs above referred to, we have remaining two smaller ones, that north of the nave 750 feet by 87, and that at the south of it 750 by 200 feet. Each of these is subdivided into three courts by two 50 feet aisles. The centre courts are 150 feet long, and those at the ends 250 feet. The dividing aisles on the north lead to the refreshment rooms, on the south to the entrance vestibule.

Twenty-five feet above the ground floor are the galleries, following the same line as the aisles; they give an additional exhibiting space of 203,000 square feet. Particular care has been taken to make these galleries amply strong for the heavy moving loads they will have to bear. The floors are supported on cast iron girders fixed to the



Section of One-half of a Nave Rib, showing the cross-bracing in the Gallery.

columns; over them are laid two strong suspended trusses which carry the joists and boarding.

Supposing a floor to be loaded with 140 lbs. to the square foot, which, being more than the weight of a dense crowd of people, is heavier than any weight it can have to bear, the greatest load that can thus be placed on a girder is 34 tons. The breaking weight of the girders used is 88 tons, and every one of them is proved in a hydraulic press, spe-

cially constructed for the purpose, to a load of 38 tons, to avoid all risks of bad castings being used. Over each gallery is a flat roof covered with felt, supported like the floor, but of much lighter construction. Sixteen flights of steps, 10 feet wide, give ample means of ascending from the ground to the upper floor.

The galleries play a very important part in the construction of the building; they are made to form an abut-

ment to the nave and transept roof, and the particular form of bracing by which this is effected is the ingenious suggestion of Mr. Ordish. The roof thrusting outwards tends to throw the columns out of the perpendicular; strong iron braces are, therefore, anchored to the foundation of the inner column, and carried up to the top of the opposite outer column, which are thus made to counteract the thrust of the roof. Another bracing, anchored to the footing of the outer column, is carried up to the top of the inner column, to secure it from being acted on by the force of the wind. This vertical cross bracing is repeated at every 100 feet, or every fourth bay, and by introducing horizontal diagonal bracing under the roof flats, they are turned, as it were, into a deep horizontal girder, supported at two ends by the columns vertically braced as just described. This horizontal girder, therefore, takes the thrust of the three intervening ribs. The way in which the bracing is introduced is very clever, and is an admirable example of the perfect control which the simplest mechanical means, properly applied, gives us in dealing with enormous masses. The bracing is all adjusted by connecting screw links, on a plan very similar to the method of joining railway carriages; by this means it can be tightened at pleasure, and the position of the columns corrected to the minutest fraction of an inch.

The drawing of the rib also shows the vertical cross bracing, which will, I hope, be thus made perfectly clear to you. (See woodcut p. 47.)

OPEN OR GLASS COURTS.

You will recollect that in describing the position of the aisles and galleries, I explained to you how they enclosed six courts, three north of the nave, two of which are 250 by 87 feet, and the other 150 by 87 feet—three south of the nave, two of which are 250 by 200 feet, and the other 150 by 200 feet. These form the open or glass covered courts, and are the only portions of the building which in this particular resemble the Crystal Palace of 1851. They have only a ground-floor, and the roof, which is on the ridge and valley plan, but in spans of 50 feet, is entirely covered with glass. The roof is carried on square iron columns 50 feet apart each way, at the top of which, 50 feet above the ground, wrought-iron trellis-girders are fixed on lines running east and west. The columns and trellis-girders carry the principles of the roof, which are all of iron, on the trussed rafter plan, eight feet apart. The roofs are drained by channels in the vallies conducting the water down the hollow iron columns. The effect of these courts with their light glass roofs admitting floods of light into the building will give a pleasing variety to the interior, and afford most valuable exhibiting space. The whole of the S.W. court, with a portion of the adjoining aisles and galleries, has been allotted to France, which will have the greatest space of any foreign country.

DOMES AND GROINED RIBS.

We now come to the great domes, which, from their stupendous size, will form one of the most prominent and interesting features in the building.

I have before explained that they are situated at the intersection of the nave and transepts. Their form and position have been thus determined. The intersections of the lines of columns in the nave and transept aisles form two octagons, which, though not mathematically regular, are regular in this one respect—their opposite sides are parallel and equal, the length of the sides being alternately 85 feet and 35' 5". The points at the angles of these octagons are the chief supports of the domes. For this purpose there is a column at each angle, 2 feet in diameter, and for architectural effect, as well as for carrying the groined ribs, the object of which I shall presently explain, the lower portion of these 2-feet columns is clustered with two round and one square column of smaller dimensions.

But though the chief points of support are at the eight angles of the octagon, the dome is a dodecagon, the other four points being thus obtained. The last bay of the nave and transept, instead of having a roof resting on

wooden principals going straight across, has two iron diagonal ribs crossing it, forming as it were a groined arch, whose apex is a point in the centre of the bay and in a line with the roof ridge. By joining the apices of these groins and the points in the octagon already determined, we get a nearly regular dodecagon, having its opposite sides parallel and equal, and with eight sides in pairs each equal to 43' 9", and the four remaining sides coming between these pairs, each equal to 35' 5". This dodecagon forms the base of the dome, which will thus have eight sides over the nave and transepts, and four sides over the corners of the aisles, equal respectively to the dimensions just given, and a diameter of 160 feet.

Each groined rib transmits the weight on it to two columns outside the octagon, so that the dome may be said to rest on 16 points, its pressure on the angles of the octagon being nearly five times ($4\frac{2}{5}$) as much as it is on the adjacent columns of the nave and transepts.

By the very ingenious and novel plan of the groined roof ribs a dodecagon dome is made to seem to stand on an octagon; no additional columns of support but those actually coming in the sides of the nave and transepts are used, and thus an uninterrupted vista is obtained through both, and a very beautiful architectural effect produced.

You will see a drawing showing a projection of one of the groined ribs on a line at right angles to the nave, its curve forms a semicircle, to correspond with the curve of the other ribs, but its actual elevation will show a semi-ellipse, whose diameter, 88½ feet, is the diagonal of the rectangle formed by the four supports of the groins.

Each rib is two feet deep, with a web of $\frac{3}{8}$ in. plate-iron, to the edge of which is rivetted a top and bottom flange formed of angle-iron in such a way as to give the top flange an area of $10\frac{1}{8}$ in., and the bottom flange an area of $19\frac{1}{8}$ in. The principal rafter and its upright are also made of wrought iron, having a web 12 in. deep, with an equal top and bottom flange of angle iron rivetted to it so as to give it a sectional area of $20\frac{5}{8}$ in. Radial pieces of iron $8 \times \frac{5}{16}$ in., connecting the upright and principal rafter with the circular portion of the rib, are introduced every 5 feet. At the intersections the ribs are strengthened by additional plates of iron, and here, for a short distance, they assume the form of a box girder. A drawing, showing the details of these portions on a large scale is provided, and will, I hope, fully explain their construction.

The intersections of the principal rafters and semi-ellipses are connected together by a cast-iron standard, which is continued up above the ridge of the roof to a point 107 ft. from the nave floor line, this being the level of the bed on which the dome ribs rest.

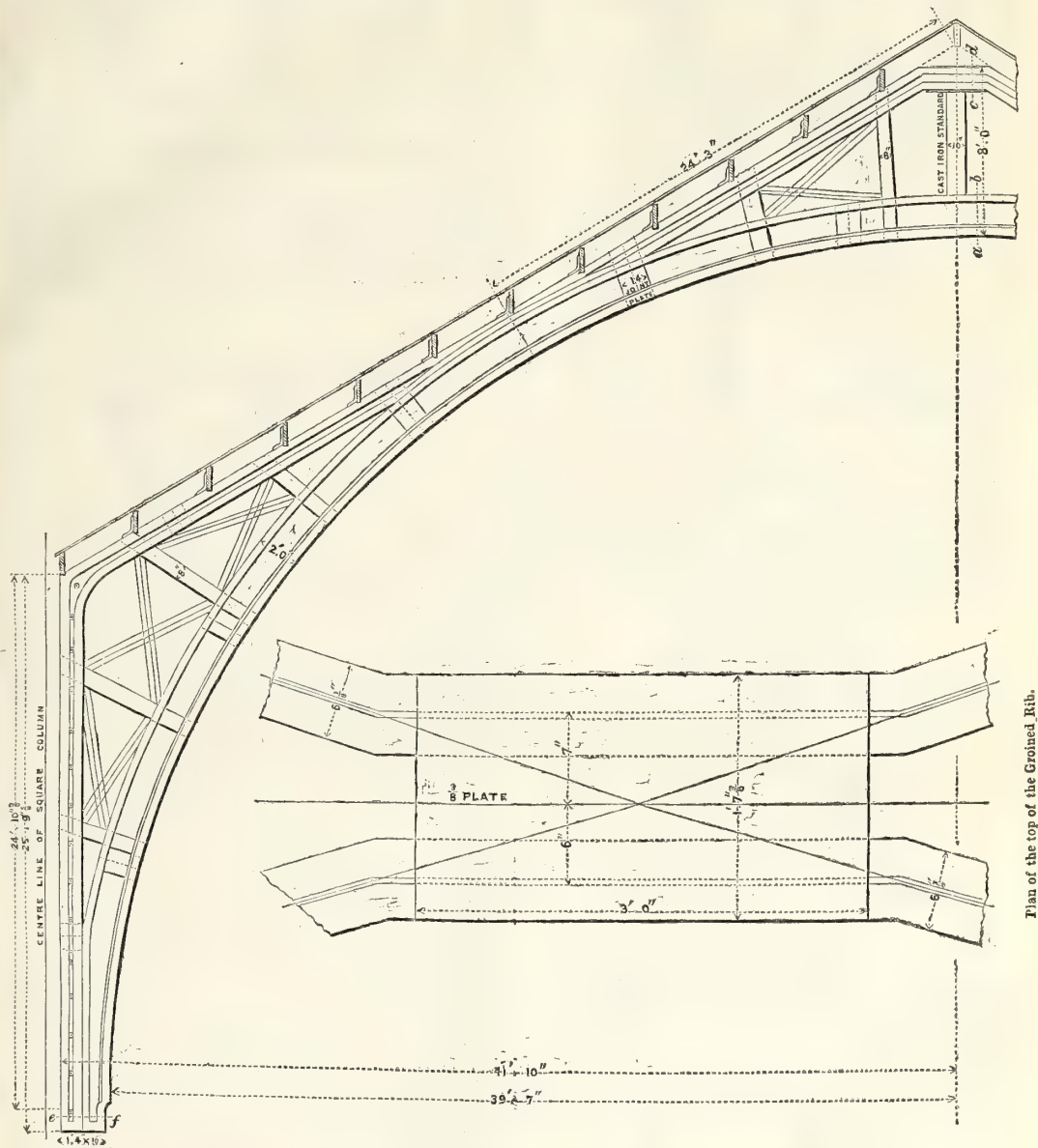
The large columns at the angles of the octagon are two feet in external diameter with seven-eighths of an inch of metal, and they are raised in three lengths to a height of 95 feet, their ends being joined together by flanges and screwed nuts on the inside. To fasten the bolts, a man is lowered down inside the columns, the diameter of which is sufficient to give room for him to screw up the nuts. The columns are thus kept perfectly smooth on the outside, and appear like one casting 95 feet long. To the top of each two-foot column is bolted a cast iron stanchion 12 feet high, whose summit is therefore just 107 feet above the nave floor. On the tops of these stanchions, and resting on ornamental brackets, a gallery three feet wide is carried round the outside and inside of the drum. It will not, however, be accessible to the public, but only to men employed in opening the louvres which are here placed for ventilation. To the upper side of the gallery, and through it to the stanchions, the double wrought-iron tie-plate acting as the dome's hoop, is securely bolted. It consists of an inner plate of iron $6'' \times \frac{3}{8}'' \times 6 \times \frac{3}{8}$, which is connected with an outer plate $10'' \times \frac{3}{8}'' \times 10 \times \frac{3}{8}$, so that both these plates take the thrust of the dome. The dome ribs are bedded on the top of them, with their feet bolted through to the heads of the stanchions.

Each dome rib is an iron girder made of boiler plate and

angle iron. The top and bottom flanges are nearly equal in section, the former being $19\frac{5}{8}$ ", the latter $20\frac{3}{4}$ " $20\frac{3}{4}$ ". There is no continuous web between the two flanges, but they are joined at 8 feet intervals by two pieces of boiler plate, having a 3" wood spacing piece between. The first seven feet of each rib is vertical, and the girder is here $3\frac{1}{2}$ feet deep. At the summit of the vertical portion, which is 114 feet above the nave floor level, is the spring-

ing line. The top flange follows the curve traced by a radius of $91' 9\frac{7}{8}"$, the centre being a point $12' 3\frac{3}{8}"$ beyond the centre of the dome; the bottom flange is on a curve whose radius is $90' 1\frac{1}{4}"$, and centre $14' 0\frac{1}{2}"$, beyond the dome's centre.

The two flanges thus come nearer each other as they approach the apex, where they are only two feet apart. This point is 91 feet above the springing line, and the



Elevation of Diagonal Ribs, supporting the Rib of Dome over Nave and Transepts.

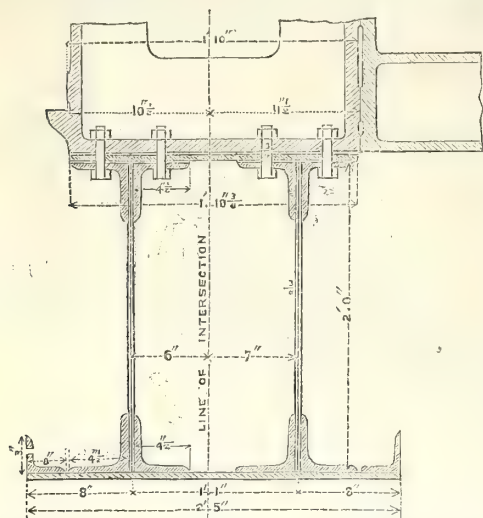
12 ribs meet there, abutting against a strong cast-iron pipe, one foot in diameter, to which they are bolted.

Eight wrought-iron purlins between the springing and the apex are bolted to the ribs, and the divisions thus formed are strongly cross-braced, so as to make the whole as rigid as possible. These purlins are formed of two pieces of T-iron, joined together at six-foot intervals by a half-inch plate. They vary in section, decreasing as

they approach the summit, and those in the larger triangles are slightly heavier, on account of their longer bearing. The first purlin of a large triangle is $1' 8\frac{1}{8}"$ deep, and its T-iron flanges are $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{1}{2}$ ". The upper purlin has a continuous web plate $10\frac{1}{2}"$ deep, with top and bottom flanges made of four pieces of L-iron, $2" \times 2" \times \frac{1}{4}"$. These dimensions are altered in a small triangle, the depth of the lower purlin being $1' 8\frac{1}{8}"$,

Plan of the top of the Groined Rib.

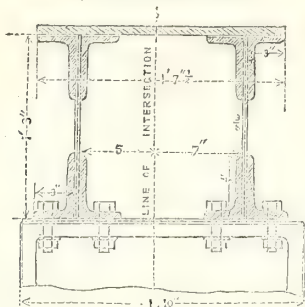
and the T-iron $3'' \times 3'' \times \frac{1}{2}''$; the upper purlin is here 11" deep, but the L iron is the same as before. Wrought iron sash bars to carry the glass are rivetted to the purlins every 18 inches, every fifth bar being made sufficiently heavy to assist in the cross bracing, and prevent the purlins twisting.



Section on Line *a b* in elevation, showing junction of Diagonal Ribs at crown of Arch.

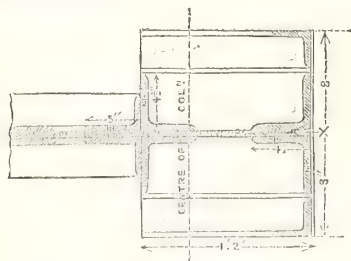
The crown of the dome, for about thirty-two feet down, has an ornamental zinc covering, but the whole of the remainder is glazed. From the apex rises the finial to a height of fifty feet, resting on a concave base, which, being

Top Plate to receive Column.



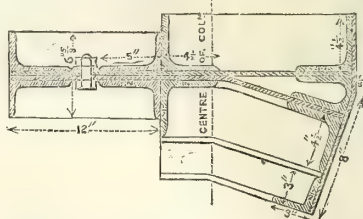
Section on Line *c d* in elevation, showing junction of Top of Diagonal Ribs.

prettily ornamented with cast-iron brackets, windows, and mouldings, is terminated by a globe surrounded by three great circles intersecting each other, from the top of which rises a gilded pinnacle.



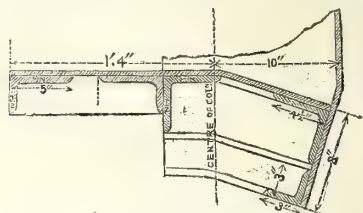
Section on Line *e f* in elevation, showing Section of Seat of Diagonal Rib on corner column of Dome.

Clerestory windows, on a level with those of the nave, are continued round the drum of the dome; panels above these reach to the gallery level, which has an ornamental railing all round.



Section showing Seat of Square and Diagonal Ribs on cap of Column of Nave.

These domes are the largest that have ever yet been executed. I have prepared a diagram, showing their size compared with the domes of St. Peter's at Rome, and of St. Paul's Cathedral; by this you will at once see their relative proportions. The Exhibition domes are 160 feet in



Section of Seat of Diagonal Rib, separated from Square Ribs.

exterior diameter, the dome of St. Peter's is 157 1/2 feet, and that of St. Paul's 112 feet. But, although our domes are in themselves larger in every way than any yet constructed, they will not rise to so great a height above the ground as either of those with which I have compared them. The Exhibition domes spring from a height of 114 feet, which makes the top of the finial 260 feet above the ground, while the cross on St. Peter's is 434 feet, and that of St. Paul's 340 feet above the pavement.

DOMES SCAFFOLDS.

The scaffolds for the construction of these domes are on a greater scale than anything of the kind ever executed. They are literally forests of timber, occupying nearly the whole interior space of the domes, cross-braced and bolted together in every possible way, so as to give them sufficient strength, for they will have to bear the weight of the whole of the iron in the domes, 120 tons in each.

The scaffold is carried up in eight different stages, between which are horizontal beams. The central portion is a square of 24 feet, rising to a height of 200 feet. As this ascends each stage is cross-braced vertically. From the centre radiates a scaffold into each triangle of the dome, to which it is in shape similar, though not quite so large. These radiating scaffolds have independent vertical bracing, while at each stage they are cross-braced horizontally, and connected with the central scaffold as well as with each other. The main timbers in the scaffold are from 14" to 12" square, while the cross-bracing is, on an average, 12" \times 6". This work was put up by Mr. Clemence, the contractor's clerk of works, and must be considered a *chef-d'œuvre* in scaffolding; it is of immense strength, and so skilfully constructed, that very little of the timber in it has been spoiled by cutting, so that when taken down, every particle of wood used, amounting to 40,672 cubic feet in each scaffold, will be as available for any other work as if it had just come from the builder's yard.

Among the drawings you will see a plan of the scaffold, which will show you all the details of construction.

They were completed in eight weeks, and every beam in them was hoisted by the steam-winch before described, without the aid of which they would have required at least double the time, and have been far more costly to execute.

THE ANNEXES.

Having now gone through the various portions of the permanent buildings, I shall proceed to a description of the annexes or temporary buildings adjoining the Exhibition.

The plan of having detached buildings for machinery will be a great improvement on the 1851 Exhibition, where everything was under the same roof; for, admirably arranged and ventilated as that building was, yet the smell of oil and grease inseparable from machinery, occasionally intruded itself on those who were examining objects which might have been expected to afford an exemption from that unpleasantness.

The western annexe is 975 feet long; for a length of 720 feet, it is 200 feet wide, the remaining 255 feet being 150 feet wide. The east side is enclosed by the back wall of the west arcade of the gardens, and the west side, which adjoins the road, has a plain lath and plaster front. It is covered by a ridge and valley roof, supported on most ingeniously constructed light wooden ribs of 50 feet span, placed at 15 feet intervals. These ribs are similar in construction to those of the nave, that is, they are formed of planks nailed together, but they are very much lighter. The circular portion springs at a height of 10 feet above the ground line. Its elevation is nearly half of a regular polygon, described about a semicircle, whose diameter is 50 feet; it consists of 3 planks 9 in. wide, the centre plank is $1\frac{1}{2}$ in. thick, and has nailed to it on either side a $\frac{3}{4}$ in. plank, the ends breaking joint all through. The principal rafters, which are composed of two $\frac{3}{4}$ in. planks, rise from a point 28 feet above the ground, and meet above the curved ribs, so as to make the ridge 5 feet above the crown of the arch. The upright, which has its foot morticed into a sleeper resting on piles, is formed of an inch and a quarter centre plank, with a $\frac{3}{4}$ in. plank on each side, having a strengthening piece 4 in. \times 3 in. spiked to it on either side to prevent its bending. The principal rafter and upright are connected with the curved rib by radial pieces of $1\frac{1}{2}$ in. plank, which are brought rather below the intrados of the curve, and finished off, for the sake of ornament, by a spear head. The roof frames are therefore merely planks nailed together, and so disposed that the weight comes on their edge. One half of the roof is covered with boards and felt, and the other half has a glazed skylight, with louvers for ventilation throughout the whole length. The span of each rib is 50 feet, so that in the 200 feet width there are four spans, and in the 150 feet, three.

The west annexe will be devoted to the exhibition of machinery in motion, for which purpose steam pipes, water pipes and shafting will be led through it. There will be a boarded floor all through, but the heavy machinery, will, of course, be bedded on the ground, independent of the floor, which will only be used for passages. The entrance to it will be through the north end of the west transept, from whence the successive ribs of the roof afford a beautiful perspective view from end to end, and produce a singularly light and elegant effect.

The superficial extent of the west annexe is 184,000 square feet, or about $4\frac{1}{2}$ acres; it will of itself be a perfect exhibition of its kind, and contain the most ingenious mechanical contrivances of this inventive age. Here we shall see some of the most ponderous marine engines in comparative miniature, but yet sufficiently powerful to drive shafting to work full-sized machines employed in various branches of manufacture. The many uses to which water power can be applied will be shown, and we shall have specimens of the most interesting machines from every part of Europe and America performing the office for which they were designed.

To a mechanical mind this will doubtless be the most

interesting section of the Exhibition, for here will be grouped alongside each other the most cunningly devised machines in the world. What endless occupation and suggestive thought will a careful comparison of them all give rise to!

The building itself will be worthy of its contents, for in ingenuity, economy, and simplicity, it is allowed to be a triumph of construction. It requires no framing; any person of ordinary intelligence, able to drive a nail, could construct the ribs, which have nothing in them but nails and sawn planks. Each rib was made in a horizontal position, over a full-sized drawing, marked on a platform, and, when complete, hoisted vertical by means of a derrick; to prevent it from wobbling, which, from its extreme thinness, it was very liable to do; it was stiffened while being raised by having scaffold-poles tied across the angles, which themselves formed the scaffolding for finishing the roof.

The frames are braced together at the top of the uprights, and the ribs are strutted from the wall-plate, to prevent buckling.

The rain water is let off by pipes, attached to every third rib, to drains under the floor. I have prepared very full detail drawings of this shed, as well as a model of two bays of roofing, by the aid of which you will clearly understand its construction. These roof frames were first of all used in the roof of a drill shed designed by Capt. Fowke two years ago for the 1st Middlesex Engineer Volunteers, at South Kensington. The span of this is 40 feet, and the boards are even lighter than in the annexe-roof. The roof to the entrance to the Royal Horticultural Society's Board-room was the next made, and its ribs are exactly of the same dimensions as in the machinery shed, except that in the latter they are stilted up six feet higher, and are 15 feet apart instead of 10 feet.

I believe it has since been copied for several volunteer and other sheds, and it is doubtless capable of very general application, whether used in temporary or permanent buildings, for it can be made of any required strength by merely increasing the planks; its leading feature is no bolting and no framing.

The eastern annexe is exactly similar to the western in its construction, but by having a large open court 350 ft. by 100 ft. left in it, its covered area is only 96,000 ft. Its total length is 775 ft., and it will be entered from the east transept by means of a covered communication or tunnel under the porch of the Horticultural Gardens.

This annexe is intended for large agricultural implements, and any other heavy machines which do not require to be put in motion to show them off.

Large metallurgic, mineralogical, and geological specimens will also be placed here, and 30,000 square feet at the north end has been most judiciously set apart for a third-class refreshment-room.

LAYING OUT OF THE WORKS.

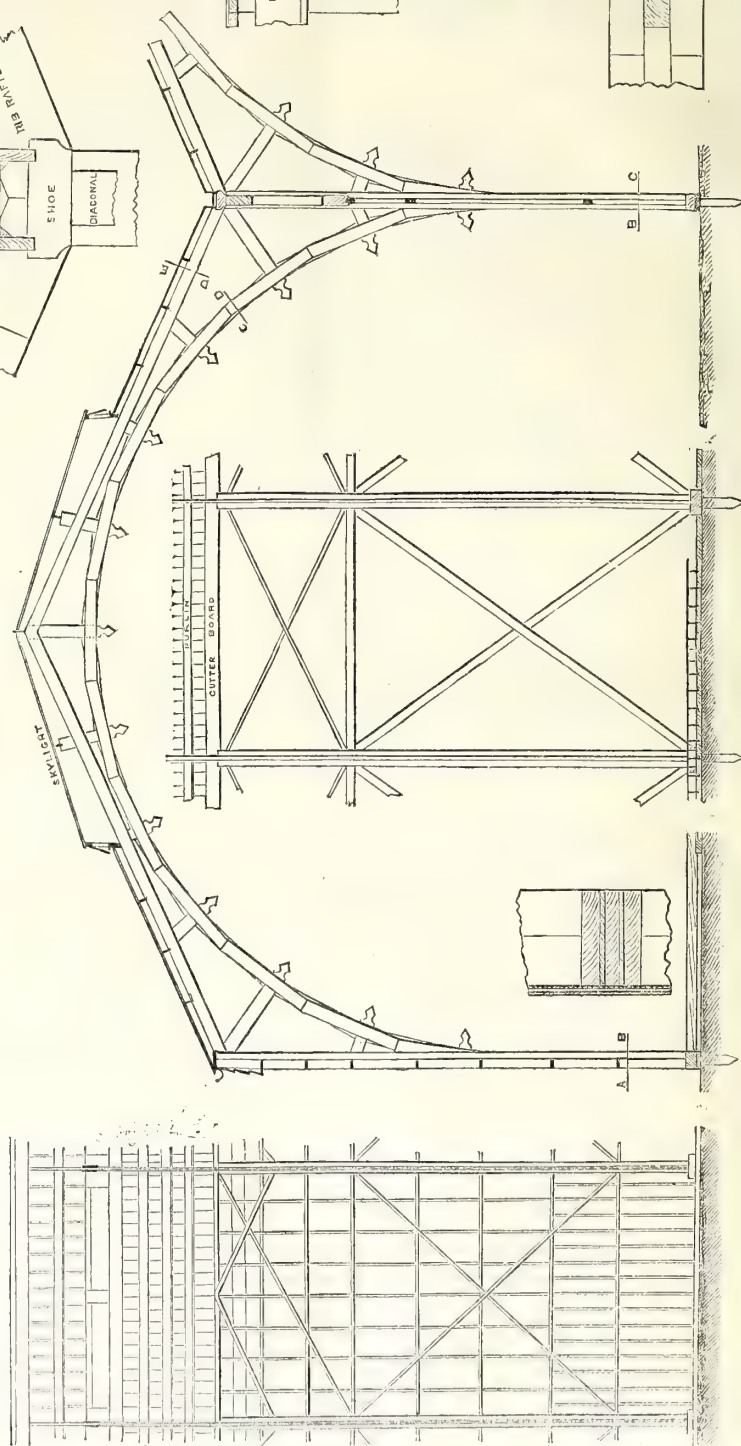
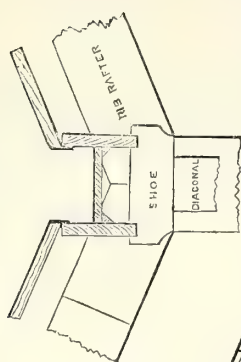
The laying out of the works was commenced on 9th March, by three independent agencies—Mr. Marshall on the part of the contractors, while Mr. Wakeford and Sergeant Harkin, Royal Engineers, acted for the Commissioners.

Great care had to be taken with the measurements, for the slightest error would have thrown out the work considerably, and have occasioned great difficulty in fitting the girders. In the three separate measurements made, the mean variation was only three-eighths of an inch, a difference quite imperceptible in a piece of ground 1,200 feet by 600 feet. A glance through any of the aisles will show how accurately the work has been conducted; and whether they be examined on the square or diagonally, the columns will be found to range in line as perfectly as they would show in a plan.

About two weeks were occupied in making the measurements, so that the building may be said to have been actually commenced in the beginning of April, since when its progress has been uninterrupted and rapid.

ARCH OF ANNEXE.

Detail of Valley Gutter.



Inside Elevation of Walls between Ribs.

Section at A B.

TRANSVERSE

Elevation between Span of Ribs,
showing Divisional Bays.

SECTION.

Section at B C.

You will see arranged round the room a very beautiful series of photographs, taken by Corporal Spackman, Royal Engineers, illustrating the state of the works at the end of each week from the commencement.

QUANTITIES.

It may perhaps interest you, and at the same time give you a good idea of the size of the building, to state the quantities of the chief materials used in its construction.

There are 7,000,000 bricks used; these have all been supplied by Messrs. Smeed, of Sittingbourne. Nearly all the cast-iron work has been supplied from the Stavely iron-works, in Derbyshire; there are upwards of 4,000 tons of this metal in the building; and to show you what care has been taken with the castings, I need only say that only four girders have proved defective, by breaking in the hydraulic press.

There are upwards of 820 25-feet columns, equal in length to 4 miles, and if the 1,266 girders used were placed end to end they would reach a distance of 6 miles. The wrought iron is chiefly supplied by the Thames Iron Company, the builders of the "Warrior." This firm has undertaken the supply of all the iron for the domes, the groined ribs, the 50 feet roofs, and the iron trellis girders which support them; the total quantity of wrought iron in connection with these parts amounts to 1,200 tons.

The timber work is executed partly at the works of Messrs. Lucas, at Lowestoft, and partly at Mr. Kelk's works at Pimlico; the former prepare all the window sashes, &c., &c., by machinery; and the latter constructs the heavy ribs of the nave and transepts. Upwards of 1,300,000 super feet of floor will have to be laid.

To cover the roofs 486,386 square feet of felt are used, equal to 11 acres; and to complete the whole of the glazing requires 553,000 super feet of glass, which weighs 247 tons, and would cover 12½ acres.

The whole of the working drawings have been prepared by Mr. Meeson, who has had charge of the details of construction from the time that the building has been put into the hands of the contractors, and who performed a similar duty in the erection of the Houses of Parliament, under Sir Charles Barry, as well as in several other large undertakings.

FIRE PRECAUTIONS.

The greatest care has been taken to have ample means at hand for the prompt extinction of that enemy which is common to all buildings, and of whose ravages we have recently had such fearful examples—fire. Water under pressure has been laid on to every part of the building, and there will be no less than 80 hydrants evenly distributed throughout. The water is supplied by the West Middlesex Water Company, and will have a head varying from 200 to 100 feet. A nine-inch main traverses the building from west to east, and from it 4-in. branch pipes are led in all directions to supply the hydrants. This is sufficient to throw any amount of water on to the roof flats, on top of which there will be portable fire-engines, to pump water on to the nave roof. As in 1851, there will, of course, be a trained body of men always on the spot to attend to all arrangements for working the hydrants, hoses, and engines; so that if, unfortunately, a fire should occur, a few minutes will suffice to bring a powerful column of water against any point.

Before concluding, I desire to impress upon the meeting that, although the building provides for the wants of the Exhibition in a better way than any other similar structure hitherto has done, my prejudice in favour of a brother officer's work must not prevent me from stating candidly, that very much remains to be done to render it a complete and permanent edifice. I believe that no building in the world, 24½ acres in extent, has ever been erected at so low a liability as £200,000, or capable of being sold for £430,000. It is only at the rate of twopence per cubic foot, whilst the rate for first-class dwelling-houses is 1s. 4d. The Houses of Parliament cost 3s. per cubic foot,

and ordinary public buildings generally may be taken at from a shilling to ninepence per cubic foot. It is not necessary to point out how unreasonable are the animadversions on this building, where economy has reigned paramount, in expecting that £1 shall do as much as £6 or £8 in other cases. The building can be viewed only as an utilitarian structure for the present. When the Exhibition has succeeded, and the guarantors are free to deal with a surplus—when the Society of Arts becomes the proprietor of the whole, as it is already, virtually, of a large portion of the Cromwell-road front—then, I venture to hope, this Society will be proud of its property, and have the means, as well as the desire, to render it, both inside and outside, a complete building, worthy of being the home of International Exhibitions for future generations.

DISCUSSION.

Mr. Henry OTTLEY begged to ask one question, and to offer a few brief remarks. As this building was intended to be permanent and to commemorate the genius of this country to all time; as, moreover, it was intended to challenge the criticism of the artists of Europe, he wished to learn, for his own information and that of others, whether (seeing that no fewer than 280 plans were sent in by architects for the building for the Exhibition of 1851,) before proceeding to the erection of the present building, any architect in this country was invited to send in plans for that structure, or whether, in the course of the construction of the building, any architect had been invited to give advice or co-operation in the matter. Captain Phillpotts had described, in eloquent terms, the architectural features of the building; and with reference to the south front, in the Cromwell-road, he stated that certain ignorant persons had represented to the public that the domes, which were considered the most beautiful features of the building, were not to be seen from the south front. He (Mr. Ottley) felt himself personally involved in that matter of ignorance. He was the means of giving some information to the public through the *Illustrated London News* as to the intended Exhibition building, and he took pains, as far as possible, to obtain correct information as to what the building would be. Not only did he obtain the services of the artists of that journal, but he was permitted to examine the drawings in the rooms of the Royal Commissioners. On inspecting those drawings he saw represented a very wide front, with two domes, one on each side; but, calculating from the plan of the building, he discovered that these domes could not be seen within a distance of 100 or 150 yards from the front of the building; therefore the including those domes as part of the building in the drawing exhibited in the room, was a false representation of the building. He stated that fact in the newspaper he had referred to, and therefore he was not one of those ignorant persons who had misrepresented the thing. He begged to ask Capt. Phillpotts from what position he obtained the view representing one of the domes as shown in the drawing before them. That drawing was a very pretty thing to show to a meeting, or to circulate in papers. It was fortunate that the artist was not restricted to the narrow point of view to be obtained from a street 60 or 80 feet wide, in which alone the south front could be seen. The view now represented must have been taken before the houses were erected, or from the top of one of the houses. In either case he submitted it was not a fair representation to put before the public.

Mr. DONALD said he thought it was a great pity that the view did not include the houses on the opposite side, which would have made it complete. The trees in the drawing were purely ideal.

Mr. DUNN would, in the first place, tender his thanks to Captain Phillpotts for his paper, which gave them a great deal of information which they did not possess before, and he for one was very glad to receive it. He begged to put a few questions, with the assurance that he did so not from any unfriendly spirit, but solely from a desire to

obtain information on those points. He would ask first—how were Captain Fowke's designs chosen?—that was to say, what number of designs (if any) were sent in besides his, and under what circumstances were his designs selected? What had been paid for those designs, and what further sum was still to be paid? What time was allowed to the various parties to make their tender for the building? How many persons did tender, and what was the nature of their tenders? Under what circumstances was the tender of the present contractors accepted? Was it true that, owing to wrong calculations as to the strength of various parts of the building, those parts had been strengthened; and under what circumstances had they been strengthened? Those questions had been brought before him in various ways; and, judging from the manner in which the contract was let, added to the questions raised in the letter of Sir Joseph Paxton on the same subject, people were led to think of these things, and he for one should be glad to have a little more information upon them.

Mr. W. N. Wilson said he doubted whether it was within the province of this meeting to discuss arrangements which were not those of the Society of Arts, but entirely those of the Royal Commissioners with regard to this building. It appeared to him, however much they might, as a society or a body of the public, or as a number of architects, be interested in the manner in which this building might have been originated, in the plans adopted, and in the mode in which the tenders were accepted, yet it appeared to him that these were matters which were entirely beyond their control, and therefore he thought the discussion of those subjects was quite superfluous, and could lead to no useful result. The only effect of such a discussion he thought would be to raise jealous feelings in the minds of some who no doubt would have liked, and were probably quite competent to take part in the preparation of plans as well as in the making of contracts; but he felt they could arrive at no good result from the discussion of those subjects. They must look at the thing as a *fait accompli*. It was, he apprehended, quite open to them to take the plans, and where they discovered faults, it was competent for them to point them out, and if they discovered merits to eulogise them. Having visited the building last Saturday, and having seen those of 1851 and 1855, he would say he was not a little pleased with all he saw in the structure now in course of erection. There was much to be astonished at—first, as to the great amount of work already done; and, secondly, as to the great amount of work still to be done, and which, he was sanguine enough to believe, would be completed by the time specified, and that the Exhibition itself would be—what he was sure they all heartily wished it might be—a great success. With reference to the drawing of the south front of the building, to which exception had been taken by the preceding speakers, he would say that the artist might have taken some little poetical license. It was a common thing to make pictures look as artistic and as pleasing as possible, and he thought there was no particular objection against the introduction of a few trees in the foreground. The building itself presented two or three features of great interest, which they must highly appreciate. The only thing he considered to be wanting was additional strength in the annexes, and he should be glad to hear from Capt. Phillpotts whether sufficient calculation had been made as to the strength required for the putting up of shafting to drive the ponderous machinery alluded to in the paper. As a mechanic, he (Mr. Wilson) had some doubts on the subject. His impression at the time of viewing the building was that they should have none of those magnificent effects which they had in the Exhibition of 1851, but that impression had been modified by the explanation that these effects would be obtained from the domes at the eastern and western entrances. He repeated that he had no doubt as to the entire success of the approaching Exhibition; and in the tournament of arts and manufac-

tures he did not believe this country would be behind-hand, particularly in all those matters which appertain to our great commercial interests.

Mr. HENRY COLE, C.B., said the gentleman who spoke first had inquired if any architect had been consulted in the preparation of the plans for this building. He came prepared to hear that question asked, and in return he would ask that gentleman to have the kindness to define what an architect is. He had taken some pains to find out, and he confessed himself rather puzzled. He had gone to past times, in order to ascertain who had built some of the most striking buildings in Europe, and to find out whether they were or were not architects in the sense in which the term was understood. He would pass over some of those buildings and builders rapidly, in order that the gentleman might satisfy himself whether or not they were built by architects. In the first place, they had the exquisite belfry of Giotto, at Florence, who was bred a shepherd, and became a painter, and subsequently an architect, but he found no facts to substantiate that he was brought up professionally as an "architect." He next took Brunelleschi, the inventor of domes, who was originally a goldsmith; after that a sculptor, then a painter. He then became enamoured of construction, and as a self-taught architect built the dome of Florence, the constructive principles of which were adopted by Michael Angelo in St. Peter's at Rome. He had never heard that Michael Angelo himself was ever articulated in a professional architect's office. He began his career as a sculptor, was eminent as a painter, and subsequently took up with architecture and military engineering. Bramanti, he dared say, had been heard of. He began as a painter, and subsequently erected a great part of the Vatican; hence he had been called an "architect." Leonardo da Vinci was in the first instance eminent as a mathematician, then as a modeller, then became a painter; subsequently he wrote some poetry, and afterwards became a water and military engineer, and in the latter capacity defended a number of the strong posts of Italy. Subsequently he erected a number of buildings, and became what was called an "architect." Palladio—a name which he had no doubt heard of—began as a geometrician; he never heard that he served his time to an architect; he had no systematic education in that profession, and yet he erected buildings which made him renowned. San Gallo, another eminent constructor, began as a sculptor, and subsequently became an "architect." He supposed the questioner had also heard the name of Inigo Jones; he began as a carpenter, afterwards he became a landscape painter, and met with patrons who sent him to Italy, where he turned his carpentering to good account, learned to erect buildings, and became an "architect." They had all heard the name of Wren. He (Mr. Cole,) should like to challenge anybody to show that he was an architect in the sense in which they understood it. He was very ingenious in making mechanical toys. He was a professor of mathematics at the University of Oxford. He happened to be acquainted with the Crown Surveyor of the time, who, having got into difficulties with a building under his charge, consulted Wren, and Wren, not being a professional architect, gave him sound advice, which led to his stepping into the place of his friend, and he erected St. Paul's Cathedral against much architectural advice; hence posterity called him an "architect," and it was commonly supposed that he was well entitled to that appellation. Then there was another person following him—Vanbrugh. They knew that he covered England with a great number of buildings, but he had no professional education as an architect. However, some people thought that he had a special genius for building. He built Castle Howard, Blenheim, and other mansions. The next most eminent name that occurred to him—coming now to modern times—was that of Sir Charles Barry, for whose talent he had much respect. Now he fancied that Sir Charles was what is called a real professionally-bred architect. Sir Charles Barry's

works they all knew; as to whether or not his Houses of Parliament were a great success the world was divided in opinion; some thought them all wrong; others thought them approximating to right. But of this point there could be no question,—having been deputed to build Houses of Parliament, in which people should be able especially to hear, and talk, or parley, he did not succeed in making rooms in which people could hear fairly well, if at all. Sir Charles Barry was also deputed to make a picture gallery for Lord Ellesmere. He had made a pretty architectural building, but unluckily not a picture gallery, as neither by day nor by night could the pictures in it be well seen. He was, however, an eminent professional architect, and notwithstanding his great reputation, the military engineer whose construction was now before them had been consulted how to make Sir Charles Barry's picture gallery suitable for the purposes for which it was designed. When it was decided what was an "architect," he (Mr. Cole) would answer the other questions which had been put by the same gentleman, who did not appear to know the difference between a perspective drawing and a geometrical elevation. That gentleman inquired if any architect had been consulted. Not using the term as meaning men who were great sculptors, painters, engineers, or constructors, but gentlemen who had served a certain amount of apprenticeship in an architect's office, he believed none of the latter were consulted with reference to the plans of the building now in course of erection at Kensington. They were, however, very largely consulted in 1851, and owing to the amount of time consumed in those consultations, the Exhibition was nearly rendered impossible. In 1850 the whole world was invited to send in plans for the building, and no fewer than 280 designs were sent in. A building committee of six of the most eminent men of the day was appointed to make a selection from these designs. Sir Charles Barry, Mr. Cockerell, and Mr. Donaldson formed the architectural section of that committee, whilst the late Mr. Robert Stephenson, Mr. Brunel, and Sir William Cubitt composed the engineering section. These gentlemen were elected a building committee, to see what they could do with these 280 plans. They sat upon these designs for seven months; at last, they came to a conclusion that none of them were suitable for the purposes of the Exhibition. They then made, or caused to be made, a design of their own. These six gentlemen, somehow or other, by a process which he knew, but would not detail, prepared a design of which a drawing was now on the walls, and he should be glad if it could be raised up to a position in the room where it could be appreciated. At last, three most eminent architects and the three best engineers of the day, published plans and a design, and there it was. [The display of the design occasioned considerable merriment.] That (continued Mr. Cole) was the design which came out of the brains of 280 gentlemen of all Europe, hatched by the united ability of six of the most eminent architects and engineers this country afforded. They had only to refer to the records of Parliament to know how it was received. The question came incidentally before the House of Commons, and a division was taken whether that design should be erected in Hyde-park or not. Parliament, the press, and the whole country, was saying, "On no account let us have that design, and don't cut up the park with a brick and mortar erection." He happened to sit, during that debate, by the side of Sir Charles Barry, who said, "Don't think that is my design, I wash my hands of it." Afterwards he met one of the engineering members of the committee in the lobby, who said, "Don't hold me responsible for that design." The day following he met another, who said, "I have nothing to do with it." In fact, every one of those six gentlemen who were supposed to have anything to do with that design repudiated any responsibility with regard to it. The result was, as they were aware, that at the eleventh hour Sir Joseph Paxton came forward with a design, but nobody would venture to say that gen-

tleman was a professional "architect." At a period when it was doubtful if Hyde-park would be used or not, and if a suitable design could be furnished by any architect, Sir Joseph Paxton came forward with his glass conservatory. His proposal was adopted, carried out with brilliant success, and it certainly was highly conducive to the success of the Exhibition. Now, instead of the wisdom of 280 gentlemen ready to contribute their brains in competition from all Europe, instead of the six eminent architects and engineers who acted as the committee, the Exhibition building of 1851 was designed by a gentleman who was known as a horticulturist. They must all admit his was a highly successful building. It got the Commissioners out of difficulty, and everyone was rejoiced now to find it re-erected at Sydenham, but it was not the work of any professional architect. Capt. Fowke, who had the highest constructive ability—amounting to genius—had been employed as Secretary to the Paris Exhibition. He had built the National Gallery at Dublin, and designed the Industrial Museum of Scotland; he had also been employed in laying out the ground plan of the Royal Horticultural Society at Kensington. That ground, almost from its first purchase, was viewed as providing a home for future exhibitions. Nothing, therefore, was more natural than that in laying out the ground he should have made provision for the site of the future Exhibition. Accordingly, when the Royal Commissioners for 1862 entered upon their functions, Capt. Fowke had plans ready. He (Mr. Cole) supposed the most partial advocates of architects and competition would not contend that the process of 1851 ought to have been repeated as regarded the building for 1862. Was all Europe to be again invited? Were seven months to be lost? Was a building committee of the most eminent architects and engineers to be again appointed, to end in another horticulturist coming forward with another Crystal Palace? He should say that, having gone through that amount of experience with competition amongst architects, a different lesson was taught. On the contrary, having a proposed building which answered the purposes admirably—having no time nor money to lose—common sense said adopt it. He would briefly state what this building would be. He would challenge any architect—English or foreign—ever to have erected such a satisfactory picture gallery as would next year be shown to the whole of Europe. The gentleman who spoke first alluded to his connection with the *Illustrated London News*, and he (Mr. Cole) saw in that paper a most comical question asked about picture galleries. Somebody had asserted that picture galleries should be lighted from the top; so the *Illustrated London News* said, thereupon, "What a monotony! Why not light from the sides? How pleasant it would be to look out of the windows." But that was not the suitable thing for pictures. If they wanted to exhibit pictures they must have walls on which to hang them, and special means of lighting to show them. It might be very pleasant to look out of the windows, but he did not think, in this case, to look out upon the building called "the Boilers" would be a particularly pleasing picture, and worth the sacrifice of hanging space. At all events he only wanted to bring either the *Illustrated London News* or its representative there present to the fact that if they wanted a picture gallery they must have walls to hang the pictures on, and common sense said they ought to light a picture gallery so that the pictures could be seen. He put forth his challenge with unhesitating confidence, that no architect had ever yet erected a picture gallery in this country or in Europe which would match that of Captain Fowke next year; and he ventured to say that the whole of Europe would pronounce that gallery to be the finest ever seen. That was what a military engineer would do—a gentleman who, according to the precedents he had shown, was no architect. Further than that, they would have a building which would not leak, as a glass building must more or less. He was a great admirer of the Crystal Palace, but he confessed it was a building

which he looked upon in the light of a conservatory; to talk of it as a building suitable for all other purposes he thought was going too far. It could not be suitable for a picture gallery, for the directors had made one within it. In the present building they would have a space in the nave exceedingly well lighted, but from the sides. By the bye, he was not sure whether the *Illustrated London News* did not object to a northern light. Now, as artists were in the habit of paying large sums to procure a northern light, it was odd to object to it. He could go through all the different points of objection taken, and answer them, but he should weary the meeting by so doing. He would conclude by saying this—having had some experience in the Exhibition of 1851, having had something to do with the Paris Exhibition, and having observed the construction of the present building, he would say if the guarantors and Commissioners desired to have a building which should be a common-sense building, and not to outrun the constable as to expense—which had been the case with some public buildings—if they wanted a thing treated according to the principles of common sense, fulfilling the objects for which it was intended—they would have in the building next year those objects realised to a greater extent than had been the case in any Exhibition building which had ever yet been erected.

Mr. OTTLEY claimed to reply to the observations of Mr. Cole, but the Chairman ruled he was out of order.

Mr. MARSH NELSON suggested the adjournment of the discussion, in order to give the members an opportunity of examining the plans and drawings, and also to give an occasion on which to reply to the very ingenious speech of Mr. Cole. He was but a humble member of the profession of architects, but as Mr. Cole had thought proper to vilify that body, he should move an adjournment of the discussion, even if the Chairman had not ruled as he had done, which ruling he thought exceedingly unfair.

The CHAIRMAN threw himself upon the protection of the meeting.

Mr. NELSON (amidst loud cries of order) proceeded to remark that the Society would not perform its duty unless it afforded full opportunity for the discussion of so important a subject as this, which he contended ought not to be passed over in a single evening. An additional reason for an adjournment, he submitted, was offered by the fact of the unfavourable state of the weather on Saturday last for properly viewing the building.

Sir THOMAS PHILLIPS (Chairman of the Council) would address a few observations to the meeting, because he could not help thinking they had forgotten, to some extent, the object the Council had in view in presenting to the Members a description of the building for the Exhibition of 1862. Any fair criticism of the building itself would be a perfectly legitimate subject for the meeting, but they had no right to sit in judgment upon the acts of gentlemen who were not before them, viz: the Royal Commissioners for 1862. Let it be remembered that those gentlemen had undertaken an extremely onerous, an extremely anxious, and an extremely difficult duty, at the request of this Society; they were a body called into existence by the Society itself—that selection having been concurred in by the numerous persons who had joined in the guarantee fund. Those gentlemen had undertaken the duties of Commissioners for the Exhibition of 1862, and they had done so upon the thorough understanding that they were to be absolute—that they were themselves to be the sole judges of the course to be taken; and it would never do for the Society now to set themselves up as judges over those to whom they had delegated such absolute power, and to express opinions unfavourable to the course they were pursuing. The Council of the Society simply desired to present to the members a description of the building for the Exhibition of 1862. It was thought it would be interesting to them to know all that was being done to carry out that great enterprise, but it would never do for the Society to say to the Commissioners: "You ought

to have pursued a different course; you ought to have invited competition in the plans for the building; and you ought not to have entrusted Captain Fowke with the execution of the works." The Royal Commissioners were not before them in any way. The motives for their conduct they knew not. The paper read that evening had not been prepared at their request, nor was he aware that it had been done with their knowledge. But it was the desire of the Council to bring before the meeting an accurate description of the building, to show them what preparation had been made for the approaching Exhibition, and to give them an opportunity, if they pleased, of criticising the building itself. The Council were aware that they opened this question of the merits of the building, but he would ask the meeting, in justice to men who were not present—in justice to men who could not be heard—in justice to men who might say, "We have been called into action by yourselves; you must have considered that we were fit men to be entrusted with the duty; we have endeavoured to discharge that duty honestly, anxiously, and carefully, and we are not now before you to have an opinion expressed upon our conduct;" in justice to those gentlemen, he asked them to take a course which the position of the Society, in connection with this undertaking, should lead them to take. He trusted they would feel that to convey an implied censure upon the proceedings of the Commissioners was a thing they ought not to do; and he would ask them to limit the discussion to its legitimate object and scope, viz., the consideration of the building which had been explained to them.

Mr. SOWERBY agreed with Sir Thomas Phillips, that they had departed from the proper object to be discussed. The thing to be considered was the merits or demerits of the building itself. With regard to the Exhibition of 1851, he was present when that building was discussed before the Institution of Civil Engineers, but they must remember that there was a great difference between the Exhibition of 1851 and that of 1862, inasmuch as, at the former period the whole question was a novelty, and it was difficult to hit upon a design to suit such a purpose. He was amongst the visitors to the building on Saturday, and his first impression was that it was not equal to that of 1851, and he thought it would have been well if the Council had called upon the architects of this and other countries to supply designs for the building of 1862. If that had been done he had no doubt a great improvement would have been shown over the designs of 1851, particularly as to mechanical contrivances and appliances.

Vice-Chancellor Sir Wm. PAGE WOOD, F.R.S., said, the period had now arrived for proposing a vote of thanks to Captain Philpotts for his paper, for the large amount of information he had communicated, and for the great delight which had been afforded to most present. Whatever difference of opinion existed as to whether or not it was possible that a better building could have been designed, they should at all events have a building well fitted for the purposes for which it had been constructed—a building a portion of which would be permanent, and which, therefore, could not be brought into comparison with the building of 1851, which was never intended to be permanent. They would also have that building constructed in a very short space of time, and at what seemed to him an inconceivably small amount of expense, when they saw the extent of the building itself, and the very handsome and ornamental features which existed in the two domes, themselves of dimensions such as had never yet been erected in any part of the civilised world. At that late hour of the evening he should be very brief in proposing a vote of thanks to the gallant captain for his able paper; but he could not sit down after the painful observations which had been made with reference to the decision from the chair, without bearing witness, as one who had sat for some time in the House of Commons, that it was a thing unheard of in public debate for any person to address a meeting twice, except the proposer of the original motion, who had a right to reply.

Mr. NELSON said that an explanation was allowed.

Sir W. PAGE WOOD.—The only explanation allowed was this—if a speaker was stated by any person who answered him to have said something which he did not say, he had a right to get up and say, "I did not say that," and that was all the reply he could make; and though it was unpleasant—and he had himself suffered it—to get up in the House of Commons and make a speech, and afterwards hear one's arguments twisted all manner of ways, and, as it might be thought, perverted—yet, if the reply fell short of making a speaker say anything he did not say, then he must sit still and bear it, without the possibility of making a counter statement. It was obvious if there was no such rule of debate they might sit there an unlimited time. He felt it due to the chairman to state this, because in no assembly had he ever heard it said that the gentleman presiding was unfair in the decision he gave. That was a remark which ought never to be made, and he had never before heard it in any meeting of any description. Having thought it just and right to make these few observations with reference to the chairman's decision—which he submitted was not only fair, but if he might be allowed to say so, was the only consistent one that could be given, he now came to the more pleasing duty of saying that he was sure the meeting would be unanimous in agreeing that they were extremely indebted to the gallant captain who had afforded them this information. He must have taken great pains to prepare such a paper, and he had shown great ability in rendering details of a somewhat dry character explicit, and in many respects interesting. Those who had not yet seen the building would have the advantage of doing so with the accompaniment of these explanations, and after that description would understand it better than they would otherwise have done. He begged to propose that the thanks of the meeting be tendered to Capt. Phillpotts for the very able paper with which he had favoured them.

Mr. WILLIAM HAWES had great pleasure in seconding the vote of thanks which had been proposed by Sir W. Page Wood. He thought it necessary to call the meeting back to the object for which it had assembled. They were there simply to receive from Captain Phillpotts that kind of explanation which was necessary to complete the information which they gathered from an inspection of the building last Saturday. This paper followed that inspection, and was meant to supply these matters of detail which they could not obtain on the spot, and to enable them, with the paper before them, to understand the peculiar mode of construction and the enormous strength that was gained by very simple mechanical means. He regarded this building, not so much as an architectural structure or beautiful design, but as coming near to perfection in suitability for the object for which it was intended, and he believed it would be an entire success in placing before the visitors, in the best manner, not only the arts of this and other countries, but their manufactures and the results of their commerce. It was not to be looked at as an architectural building, for it had no pretensions to be such. No building rapidly erected as this was could have that pretension; but it had the pretension of being a building well adapted to the purposes for which it was to be employed. If that were the case, they, as a Society, ought to feel that they had promoted a great object. At the former meeting they had had laid before them the principles on which this International Exhibition was based; they had now been favoured with a comprehensive explanation of the building, and he hoped that other papers on subjects relating to the Exhibition would be forthcoming during the Session.

The Chevalier DE SCHWARZ (Austrian Commissioner), said, having been appointed Commissioner for several International Exhibitions since 1845, and having seen all the buildings devoted to those purposes on the continent, as well as that in this country in 1851, he had great pleasure in expressing his opinion that the building now

in course of erection would admirably suit the purpose for which it was intended, and would give universal satisfaction to the foreign exhibitors.

Mr. CHAS. ASPREY remarked, that it struck him the greatest misfortune of the evening, had been the attempt to answer the questions with regard to what the Royal Commissioners had done, and were doing. It appeared to him that they had one conclusive answer to those enquiries: that was in the extraordinary amount of money that had been guaranteed—nearly half a million being placed at the disposal of the Commissioners, showing that the guarantors themselves had the greatest confidence in what they were about to do. If that answer had been given at first, it would have spared much of the discussion and warmth of feeling that had occurred.

Mr. MURCHISON thought there had been too much wish to control the discussion. This was an elaborate paper the reading of which occupied more than an hour, whilst they had scarcely had three-quarters of an hour's discussion upon it. He thought, seeing the large amount of interest which the subject had excited, it would only have been an act of courtesy to the author that this discussion should be adjourned to a future evening. He rose for the purpose of making a remark which struck him in the course of this discussion. As one of the oldest members of the Society, he ventured to say that its object was the encouragement of Arts, Manufactures, and Commerce, and the mode in which they had afforded that encouragement hitherto had been by throwing open to the competition of the whole nation such objects as they considered ought to be promoted, and were worthy of the attention of scientific persons; and therefore he thought, on an occasion like this, when they were about to raise a structure which was to attract the whole universe to one spot, it would have been a noble opportunity for the Society of Arts to have exercised that principle which had been at the foundation of its prosperity—to have invited tenders for the erection of the building, as well as designs for its construction. They had been told by Mr. Cole that Captain Fowke had gained considerable experience in these matters from his connection with the Paris Exhibition, as well as with the Royal Horticultural Society in laying out their grounds at Kensington. In like manner it was to be inferred that from the more frequent recurrence of these exhibitions, the designs that would have been sent in for the building would have been of a very superior character to those of 1851.

Mr. WINKWORTH rose to order.

The CHAIRMAN said, a little latitude had been allowed in permitting gentlemen to speak after the vote of thanks had been proposed, but this must have its limits. He should be happy to hear the remarks of Mr. Murchison upon the question of the vote of thanks, the discussion upon the general subject having been closed.

Mr. MURCHISON said he was speaking in support of the motion now before the meeting, and took that opportunity of expressing his feelings as to what he considered to be the duty of the Society on such an occasion as this.

The CHAIRMAN then put the question of a vote of thanks to Captain Phillpotts for his paper, which was carried unanimously.

The paper was illustrated by a large number of plans, drawings, photographs, and models.

The Secretary announced that on Wednesday next, the 11th December, a paper by Mr. Thomas Baker, "On Railway Management, from the Passenger's Point of View," would be read.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...R. Geographical, 8½. Latest Explorations in Africa, by Livingstone and May, Speke and Grant, Petherick, Peney, &c.

Medical, 8½. Dr. Cockle, "On some points connected with the Past and Present History of Diabetes; and on a less common form of death in this disease."

- TUES. ...Civil Engineers, 8. Discussion upon Mr. Bailey Denton's paper, "On the Discharge of Underdrainage, and its Effect on the Arterial Channels and Outfalls of the Country."
R. Medical and Chirurgical, 8½.
Syrö-Egyptian, 7½. 1. Mr. Samuel Sharpe, "Three Petitions from a Religious Recluse in the Temple of Serapis, in Memphis, addressed to Ptolemy Philometer." 2. Mr. C. E. Harle and Dr. Hincks, "On an Assyrian Cylinder in the British Museum."
Zoological, 9.
- WED. ...Society of Arts, 8. Mr. Thomas Baker, "On Railway Management, from the Traveller's Point of View."
R. Soc. Literature, 4½.
- THURS. ...Antiquaries, 8½.
Royal, 8½.
Philological, 8.
- FRI.Astronomical, 8.
- SAT.R. Asiatic, 3.
- Botanic, 3½.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, November 29th, 1861.]

Dated 10th August, 1861.

1999. M. Wigzell, Friars-green, Exeter—Imp. in machinery or apparatus for making plain twisted nails, spiral fluted nails, and other similar driving articles of a twisted or spiral fluted form throughout or in part.

Dated 19th September, 1861.

2333. L. G. A. Condroy, Donai, France—An improved centrifugal apparatus, intended for purifying, washing, drying, moulding, or extracting from liquids, substances or materials of various kinds, which are deposited or poured for this purpose in moveable baskets or boxes fitted in the said apparatus.

Dated 3rd October, 1861.

2466. T. Warwick, Birmingham—An imp. in the manufacture of umbrellas and parasols, and imp. in machinery to be used in the manufacture of umbrellas and parasols. (Partly a com.)

Dated 18th October, 1861.

2596. J. Lawson and H. Carter, Royal Artillery, Woolwich—Imp. in metal musical wind instruments.

Dated 21st October, 1861.

2625. F. A. Calvert, Manchester—Imp. in engines to be propelled by compressed atmospheric air or steam.
2628. F. Fenton, Fishguard, Pembrokeshire—Imp. in obtaining and treating fibrous substances.

Dated 23rd October, 1861.

2647. J. W. Wilson, Barnsley, Yorkshire—Imp. in machinery for digging and cultivating the soil, and in steam engines connected therewith, and for other agricultural purposes.

Dated 1st November, 1861.

2735. G. Holcroft, Manchester—Imp. in the construction of blast furnaces for smelting ores.
2736. L. Thomas, 9, Union-street, Berkeley-square—Imp. in rifled ordnance and projectiles.
2737. D. Lang, 26, Skinner-street, Snow-hill—Improved moulded india-rubber boots, shoes, and other like articles. (A com.)
2750. W. B. Smith, Camborne, and W. Bennett, Tucking-mill, Cornwall—Imp. in the method of and apparatus for preventing the injurious effects occasioned by smoke, sulphur, and the deleterious gases which escape from stacks, chimneys, calcining houses, chemical and other furnaces.

Dated 4th November, 1861.

2765. J. C. Anderson, 2, Portland-place, Sumner-road, Croydon—Imp. in apparatus for projecting cricket balls with accuracy.
2770. W. T. Weston, 4, Trafalgar-square—An improved spring and fastening applicable to gates, doors, and other useful purposes.

Dated 6th November, 1861.

2790. F. G. Stuber, 1, St. James's-road, Brixton—An improved hygrometer for measuring the humidity of the atmosphere, dampness of beds, garments, and for other similar purposes.

Dated 7th November, 1861.

2794. A. W. Williamson, University College, Gower-street—Imp. in the construction of steam boilers.

Dated 8th November, 1861.

2802. T. C. Darby, Little Waltham, Essex—Imp. in the construction of horse hoes.

Dated 13th November, 1861.

2856. J. Vaughan, Birmingham—An imp. or imps. in the manufacture of bayonets, and in apparatus or machinery to be employed therein.

2864. J. Leslie, 60, Conduit-street, Hanover-square—Imp. in the manufacture of gas.

Dated 14th November, 1861.

2866. A. O. Lipsett, Manchester—Imp. in apparatus for heating or boiling fluids for domestic or other purposes.

2868. W. Heap, Ashton-under-Lyne—An improved instrument for cutting pipes and bars of metal.

2870. R. Heath, 25, St. George's-place, Hyde-park-corner—An imp. in umbrellas or parasols.

2872. G. Hawksley, Three Mill-lane, Bromley-by-Bow—Imp. in apparatus for sounding alarms and actuating ventilators.

Dated 15th November, 1861.

2874. C. H. Minchin, Manchester—Imp. in ventilators for railway and other carriages, and for other similar purposes.

2876. J. Spratt, Camden-road-villas, Camden-town—Imp. in the preparation of food for hogs, dogs, cats, and poultry, and in apparatus for the same.

2878. W. E. Newton, 66, Chancery-lane—Imp. in steam engine governors. (A com.)

2880. W. Staufen, 84, London-road, Southwark—Imp. in the manufacture of brushes, and in preparing certain vegetable fibre for such and other uses.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2940. M. Henry, 84, Fleet-street—Improved means of rendering steam-tight the opening for the passage of the piston rod through the cylinder cover in steam engines, which means are applicable also to other parts of steam engines, and parts of other engines, machines, and apparatus for the rendering thereof steam tight and fluid tight. (A com.)

PATENTS SEALED.

[From Gazette, November 29th, 1861.]

November 28th.

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|-----------------------------------|--|
| 20. T. Cobley. | 1487. F. E. Schneider. |
| 1387. W. R. Jeune. | 1553. A. R. Le Mirede Normandy. |
| 1389. J. Towl. | 1577. P. Pradel. |
| 1411. E. C. Stanford. | 1617. H. B. Barlow. |
| 1430. S. Hawkins. | 1630. W. Holland. |
| 1432. W. O. Johnston. | 1638. S. A. Bell. |
| 1437. J. Platt and W. Richardson. | 1977. A. V. Newton. |
| 1439. J. Platt and W. Richardson. | 1987. A. V. Newton. |
| 1441. J. Vaughan. | 2184. T. S. Stock, J. S. Stock, and G. Taylor. |
| 1457. H. Du Mont. | 2277. G. C. Haseler. |
| 1469. W. Clark. | 2325. W. Cory, jun. |
| 1481. J. Steart. | |

[From Gazette, December 3rd, 1861.]

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| 1388. G. B. V. Arbuckle. | 1453. J. F. Clarke. |
| 1395. S. Hargreaves, R. Holden, and H. Holt. | 1458. J. M. Worrall and T. Lawrence. |
| 1397. A. Prince. | 1463. P. O'Hanlon. |
| 1399. D. W. Thomas. | 1465. J. Rymes. |
| 1400. W. R. Floyd. | 1482. M. Hawdon. |
| 1402. J. L. Hancock and F. L. Hancock. | 1489. C. Stevens. |
| 1403. J. H. Holdsworth. | 1503. J. A. Calaud. |
| 1407. S. Standfast. | 1507. J. Watt. |
| 1408. J. A. Van Braam. | 1612. R. Jobson and C. F. Varley. |
| 1409. J. A. Williams. | 1519. E. Bing. |
| 1415. F. J. Manceaux. | 1531. P. Langlade. |
| 1418. D. Nickols. | 1534. H. J. Kennard. |
| 1420. H. T. Coles. | 1541. T. Page. |
| 1421. L. J. P. de Mirimonde. | 1542. H. C. Simpson. |
| 1427. T. Hamilton and J. Hamilton. | 1546. J. Lewis. |
| 1442. R. Harlow. | 1665. W. Clark. |
| 1447. W. Wood. | 1749. J. C. B. Salt. |
| 1448. A. A. Croll. | 1804. S. Tawell. |
| 1450. W. Leopard. | 2500. W. Callcott. |
| 1452. C. W. Lancaster. | 2504. F. J. Evans. |
| | 2526. J. Schwartz. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID, AND DATES OF THEIR PRODUCTION FOR CERTIFICATE.

[From Gazette, November 29th, 1861.]

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|--------------------|---------------------|
| November 25th. | 2839. G. F. Wilson. |
| 2714. C. Hancock. | 2878. T. Moss. |
| November 26th. | November 27th. |
| 2746. G. W. Bales. | 2751. L. Bissell. |

[From Gazette, December 3rd, 1861.]

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|--------------------------------------|--------------------|
| November 28th. | 2892. J. J. Aston. |
| 2734. J. Coulson. | November 30th. |
| November 29th. | 2722. R. Legg. |
| 2757. W. Robertson and J. G. Orchar. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID, AND DATES OF THEIR PRODUCTION FOR CERTIFICATE.

[From Gazette, November 29th, 1861.]

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|------------------------|--------------------------------|
| November 25th. | November 27th. |
| 2494. W. Blundell. | 2519. J. Mason and L. Kaberry. |
| November 26th. | |
| 2666. L. H. F. Melsen. | |

[From Gazette, December 3rd, 1861.]

November 29th.
2610. G. Gowland.

Journal of the Society of Arts.

FRIDAY, DECEMBER 13, 1861.

INTERNATIONAL EXHIBITION OF
1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £441,450, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The progress made in the erection of the eastern dome this week, is perhaps a little more promising than it has hitherto been. There is now, at any rate, something like shape and form to be discovered. Still the fact cannot be concealed, that the principal part of the task, the raising and fixing of the iron ribs, has yet to be accomplished.

The well-known ability and energy of Messrs. Kelk and Lucas, backed by their almost unlimited resources, are a guarantee of their contract being completed within the specified time, but in justice to those gentlemen it is as well that the public should be made aware that in case of any delay the responsibility of the failure does not rest with them.

The completion of the northern courts, which is part of the sub-contract of the Thames Iron Company, necessarily lingers in consequence of their exertions being concentrated on the dome. Indeed, the rapidity with which the courts on the south side of the nave have been finished, is in startling contrast with the slow progress of the corresponding works on the north. It may be pointed out that the advance of the western dome, which is in the hands of the contractors themselves, has been perhaps as tardy as that of the eastern, but it must be recollected that the execution of this part of the work is necessarily dependent on the supply of iron, which rests with the Thames Iron Company. Now, however, that the whole of the iron has been delivered, a more rapid progress may be expected on the side facing Prince Albert's-road.

All other parts of the building are in a satisfactory condition. The ironwork of the central staircases is being fixed, and the great columns which support the domes are being cased with brickwork to the height of the gallery floor. The glaziers are at work on the large windows

of the corridors underneath the picture galleries, and the carpenters have laid a great part of the flooring. It is understood that the eastern portion of these corridors has been reserved to Great Britain for the exhibition of carriages; it is well adapted for the purpose, both as regards light and space. The refreshment courts and galleries are advancing with great rapidity.

A commencement has been made on the eastern annexe, by raising some of the ribs. This annexe will consist of a series of arcades, similar in construction to the aisles of the machinery shed, surrounding three open courts. It is proposed to occupy this annexe with agricultural implements and raw produce, such as minerals and building stone; the open courts are well adapted for the exhibition of greenhouses and model cottages.

The picture galleries are fast approaching completion. The coving of the southern gallery is finished along one side, and within a day or two the scaffolding will be removed, and a clear view obtained all along the gallery. Outside nearly all the scaffold-poles have been taken down. The water-colour galleries are also being pushed forward, the roofing is fixed throughout, and nearly the whole of the top-lighting glazed. In the south-eastern gallery the walls are in course of being boarded. The upper story, over the central entrance, which it is proposed to devote to the exhibition of photography and educational appliances, is roofed in.

As regards the arrangements for the Exhibition, considerable progress has been made. All the allotments of space (with the exception of four) have been returned from provincial committees, and Her Majesty's Commissioners are actively employed in adjusting them and arranging for the exhibition of trophies and decorations. The nave and transepts are to have three longitudinal passages of seventeen feet wide, thus leaving two spaces seventeen feet each for exhibiting purposes; there is, moreover, to be a grand central transverse passage, fifty feet wide, leading direct from the central entrance-hall to the refreshment courts.

Every exhibitor, within ten days after notice of the space allotted to him has been received, is required to fill up four forms:—

1. An engagement to occupy the space placed at his disposal.
2. A return of three names of persons to serve on the jury of the class in which he proposes to exhibit.
3. The particulars of his name, address, and description of articles he wishes to exhibit.
4. The matter (if any) which he wishes to insert in the Illustrated Catalogue.

The railway companies are actively engaged in considering the arrangements to be made for

organising the traffic to and from the metropolis during the period of the Exhibition.

The following additional arrangements have been made :—

URUGUAY.

The following gentlemen have been appointed Commissioners for this Republic, in addition to Mr. Graham Gilmour, of Glasgow, whose appointment has already been notified :—Alderman Thomas Q. Finnis, of London, and Mr. John Proudfoot, of Glasgow.

PAPAL STATES.

London Commissioner.—Henry Doyle, Esq., 17, Cambridge-terrace, Hyde-park, W.

FOURTH ORDINARY MEETING.

WEDNESDAY, DEC. 11TH, 1861.

The Fourth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 11th inst., Sir John Rennie, F.R.S., in the chair.

The following candidates were proposed for election as members of the Society :—

Alcock, Michael	{ The Windsor Bridge Iron Works, Manchester.
Aldred, Geo. Edwd., M.D.	{ 14, St. James's-square, S.W.
Blaker, William Lamport	{ Bellevue, Worthing, Sussex.
Cartwright, H. C.	{ 14, Manchester-square, W.
Cleverty, James John ...	{ 16, Gloucester-place, Hyde-park gardens, W.
Dines, George.....	{ St. Anne's-hill, Wandsworth, S.W.
Evans, Jeremiah.....	{ 33, King William-street, City, E.C.
Gould, Charles Augustus.	{ Winterslow, Vassall - road, Brixton, S.
Hansard, Luke Henry, B.C.L.	{ Westgate House, Arundel, Sussex.
Jones, Wm. Hibbs.....	{ 4 and 5, Jewry-street, Aldgate, E.C.
Lawrence, Henry	{ High-street, Kensington, W.
Lindsay, Thomas	{ Mill-wall Brewery, Mill-wall, E.
Lucas, Charles	{ (Lucas Bros.) Belvedere-road, Lambeth, S.
Marcus, Henry Robert ...	{ 40, Falkener-street, Liverpool.
Messenger, Joseph	{ Spring-gardens, S.W., and Folkestone.
Ridge, Edwin James....	{ 6, Dorchester-place, Regent's-park, N.W.
Routledge, William	{ New Bridge Foundry, Adelphi-street, Salford.
Symonds, Captain, R.N...	{ 10, Adam-st., Adelphi, W.C.
Wragge, Frederick	{ Stoke-on-Trent.

The following candidates were balloted for and duly elected members of the Society :—

Ames, Henry St. Vincent, M.A.....	{ Cote House, Westbury-on-Trym, near Bristol.
Ayerst, Francis	{ 24, Bessborough-gards., S.W.
Benson, William	{ 135, Oxford-street, W.
Blake, Henry Woolaston, F.R.S.	{ 8, Devonshire-place, Maylebone, W.
Brierley, Henry	{ 8, Surrey-st., Strand, W.C.
Buchan, Jno. Hitchcock...	{ The Grove, Hanwell, W.
Cator, Geo. Albemarle ...	{ Selby, Yorkshire.
Carbutt, Geo. Henry.....	{ (C. C. Douglas) Liverpool.
Clark, Alexander	{ Tower-house, Highbury New-park, N., and 15, Gate-st., Lincoln's-inn-fields, W.C.

Cleugh, Alexander	{ Imperial Mills, Bromley, E.
Dadley, John.....	{ Birmingham.
Douglas, Charles C.	{ Dale-street, Liverpool.
Douglas, William	{ High-st., Exchange, Liverpool.
Edwardes, Thos. Dyer ...	{ 5, Hyde-park-gate, Kensington-gore, W.
Ethelston, Rev. Charles Wicksted, M.A.	{ Rectory, Uplymore, Devon.
Goschen, George Joachim	{ Eltham, Kent.
Halse, William	{ 12, Love-lane, Aldermanbury, E.C.
Hampton, Thos. Inglis...	{ 20, King-st., St. James's, S.W.
Harris, Frederick Wm....	{ Coal Exchange, E.C.
Hellman, Christian	{ Club Chamb., Regent-st., S.W.
Hook, John	{ 66, New Bond-street, W.
Jackson, Frederick	{ Nottingham.
Lyle, J. G.....	{ 20, Little Moorfields, E.C.
Makin, Edwin John.....	{ Attercliffe, Sheffield.
Martin, Henry	{ Westwood - villa, Highbury New-park, N.
Michael, Michael Henry	{ 20, The Cedars, Putney, S.W.
Oldershaw, Captain R. Piggott	{ 74, Warwick-sq., Belgravia, S.W.
Pickering, John.....	{ 40, Little Moorfields, E.C.
Schwartz, Henry Wm. ...	{ Hamburg.
Sears, Henry Beaufort ...	{ (C. C. Douglas, Liverpool.) (Messrs. Carstairs and Co.), Liverpool
Sharp, Wm.	{ Edward-court, Handsworth, near Birmingham.
Stapleton, Thos. Werney.	{ Marne-cottage, Roehampton, Surrey, S.W.
Stephens, Chas.	{ Earley-court, near Reading
Tidswell, Edward	{ 1, Friday-street, E.C.
Walton, Geo.....	{ 2, Charles-st. Grosvenor-sq. W.
Wertheimer, Sampson ...	{ 154, New Bond-street, W.
Wood, Geo. Watson	{ 24, Gloucester-street, Belgravia South, S.W.

AND AS AN HONORARY CORRESPONDING MEMBER.

Vogt, G. Berne, Switzerland.

The Paper read was—

RAILWAY MANAGEMENT, FROM THE PASSENGER'S POINT OF VIEW.

By T. BAKER, OF THE INNER TEMPLE, BARRISTER-AT-LAW.

At the time of the Exhibition in 1851, the railways having their termini in the metropolis were capable of daily delivering and returning 40,000 passengers; but it has been calculated that the Exhibition of 1862 will find the capabilities of the London railways so extended that, instead of 40,000, upwards of 140,000 people may be carried to and fro every day. It is, then, obvious, even if this carrying power stop at the present point, that the management of railways is an affair of national importance as regards the comfort of the vast number of passengers necessary to make these undertakings pay, and also the yielding a fair security to holders of railway stock.

As the comfort of the passengers must in the main regulate the amount of traffic, it is proposed in this paper chiefly to treat that portion of the subject. It may, indeed, be affirmed that there can be no comfort if the road be not good and the travelling safe; nor can the proprietors expect to secure a fair return for capital and labour, unless the advantages offered be such as to attract custom and afford pleasure. With regard to the condition of railway property, it is well-known that there is scarcely one line which is not worked at a loss, for there are few which divide £5 per cent., and that is but a fair interest for borrowed money without labour or risk; yet the capital invested in British railways already amounts in round numbers to four hundred millions sterling, or nearly half the amount of the National Debt. The mere commercial

success of these immense undertakings is in itself indeed a national question.

One reason why railways do not pay is that great extravagance was displayed in their original construction. This, however, is past remedy.

Another reason why better dividends are not paid is the absurd jealousy which exists, arising from the old stage coach notion that only a given number of persons can possibly desire to travel, and therefore any new contiguous railway must necessarily be a competing line. Hence the great battle of the gauges before Parliamentary Committees, which even now threatens to be renewed in the West. Hence the often studied delay of trains on one line, in order that travellers seeking to go forward on another, having trains apparently to suit the arrival of the first, may be disappointed and left behind,—practices so petty in themselves, that it would be hardly conceivable that men of respectability could resort to them, were it not patent that such things are done,—as if the chief object of the carrier were to disgust the traveller, teaching him to regard a journey as a bore to be avoided, instead of encouraging people to move about. The truth is, that the more numerous and accommodating the lines become, the better will they pay.

Dividends can only be raised to any considerable extent by increased traffic, and that a great increase could be provided for on existing lines with additional rolling stock, is proved by the fact that, on extraordinary occasions, and sometimes by borrowing rolling stock from other companies, the ordinary business is greatly multiplied. Indeed, to add very much to the present every-day traffic could offer no difficulty so far as the mere capabilities of the lines themselves are concerned. This is especially the case in reference to short distances and for regular travellers, and the main reason why it is not so increased is without doubt that the comfort of travellers is not as yet secured.

It is scarcely possible to conceive a limit to the extent of travelling over distances varying from 10 to 50 miles of London, or other of our larger towns, provided the facilities of which railways are capable were afforded to residents in the country having business in cities. At present these facilities are denied. It is not alone that annual fares are too high, and trains not sufficiently numerous; but, what is even of more consequence, people cannot bear the travelling. That which may be pleasant for a time, and ought to be so always, soon becomes a burden under present management, and perhaps ere the first ticket has expired, the passenger's physical strength succumbs before the process of continual violence to which he has been subjected, and the alternative of bodily prostration, or sacrifice of property and the advantage of country life, is presented.

The interest of railway proprietors, therefore, requires that these things should be gravely considered. The shareholders' interest is identical with that of the passengers; and the welfare of the latter cannot but conduce to the welfare of the former. At present, for one who tries and relinquishes the experiment of country residence, perhaps a score are deterred by the recapitulation of his loss and personal suffering; yet there is no valid reason why this should be inflicted. An hour's ride, night and morning, was a pleasure in the good old times when, "having swallowed in the roll, we rolled into the Swallow." Why should a journey of the same duration now, be productive of pain? It surely cannot be unavoidable that rapidity of motion should involve the shaking of the passenger more violently than the physic by which his medical adviser vainly strives to afford relief, so long as such abnormal exercise is continued. One gentleman, known to me, having last year purchased a residence 30 miles from town, has recently sold it, being unable to continue the travelling. A second passenger, on the same line, frequently observes, "Depend on it, I don't go oftener than I can help, for I find I cannot stand it." A third person, who had tried a shorter distance three years, says that nothing should ever induce him to undertake a regular railway journey again. A

fourth informed me that he had incurred considerable pecuniary loss by the experiment, which he had relinquished; these are instances occurring among my own personal acquaintance, but in truth, it is becoming notorious that a daily journey by rail is exceedingly trying to the constitution. Sir Ranald Martin informs me that, persons who have suffered in India from sun-stroke, are generally unable to travel by railway, and that it is a common observation, that constant travelling by railway eventually disturbs the functions of the nervous system and of the circulation, so much so, that men of business who made a habit of morning and evening journeys, have been obliged to give it up. I have also the authority of Dr. Southwood Smith for stating, as a well recognised fact among the medical profession, that delicate persons, and especially pregnant women, are very liable to be injuriously affected by a single journey; and Dr. Smith has, himself, recently known two gentlemen forced to abandon their country residences after little more than a year's experience, to save their health from permanent injury.

It may be thought, by managers of railways, that these evils arise merely from excitement acting on nervous people, but this is evidently a mistake. Men readily become accustomed to any habit which is not physically injurious, and as the novelty wears off excitement subsides. The effects of excitement are shown at first, and diminish by use; but in the case of the railway traveller the mischief is not felt until after a considerable time, the spinal column having in the meanwhile become gradually weakened, and when pain is first felt the evil may have already become deeply seated. My individual experience may afford a fair illustration of the truth of this reasoning. A person of active habits, I have often undergone considerable muscular exertion, both in pedestrian and horse exercise; having, for example, accomplished more than 50 miles on foot without resting; and on several occasions ridden that distance on the same horse in one day. As a specimen of railway experience, I may mention that in October, 1858, I left London for Liverpool, proceeded to Manchester three days after, and returned to town the following day; travelled again to Manchester on the 10th November and back the 11th. To the same place the 21st, returning the 24th; to Leeds on the 8th December, Bradford the 9th, Hull the 10th, London the 11th; on the 13th to Taunton, the 14th to Exeter, returning by same night's mail to town. On the 21st December left for Southampton at 3 p.m., returned by the night mail, and, after an hour and a half's rest, started for Liverpool the 22nd, to Manchester and Stockport the 23rd, and by same night's mail to London. To Bath 7th January, by afternoon express, returning following morning; to Bristol, 31st January, returning same night. None of these journeys produced any apparent effect on me, which may seem to afford tolerable evidence that I might resort to railway travelling with impunity. In the summer of 1860, however, having removed to a residence a little over 30 miles from town, I commenced travelling regularly—six days a week, 64 miles by rail. For the first eight or nine months nothing beyond ordinary fatigue was felt, but suddenly the aggregate result manifested itself in a sense of weariness and pain in the back, at first during each journey, but soon becoming constant. Without discontinuing the daily journey, I have succeeded in overcoming the evil, simply by standing up, availing myself of the springs supplied by nature to correct the vibration supplied by art; thus guarding the spinal column from the violent action of the carriage springs, or rather want of them;* and by resorting to other expedients of a similar kind, which it is evident that persons

* I am informed, by an experienced station master, that drivers and guards, who are necessarily robust men, are much tried by the physical strain upon them, but that guards suffer more than drivers. If this be so, the explanation I think must be, that the former sit, while the latter stand.

fond of ease, or who may not be in robust health, and ladies especially, could not practise. They therefore find themselves compelled either to abjure country air, or to relinquish urban engagements.

The cause of the evil is not the excitement of travelling, but the violent and unceasing jar of the railway carriage as hitherto constructed, combined with unevenness of the rails. Indeed, the question of the best kind of spring to afford ease to the passenger, can scarcely have been considered by the carriage builders, however luxuriously the interior of first-class carriages may appear to be fitted. In the first place, the single horizontal springs in use are manifestly inadequate for the purpose required. So unsuitable are they that it is difficult to conceive how they could have been brought into use, except from the fact that they were employed for carriages on common roads; but the coach was adapted to such road, by every method which could be devised to give ease to the traveller without distressing the horse. The latest of such improvements was the abandonment of the C spring, because by its use the momentum of the carriage was lost, or of little avail in going over stones, and the horizontal, bow, or grasshopper springs, were substituted. Taking for granted that all the latest improvements were to be adopted in the railway carriage, the coach builder seems to have forgotten that there would be no stones to hop over, and, therefore, no objection to the C spring, which is quite as easy for vertical motion, and far more easy for longitudinal and lateral motion, as well as a greater protection in case of violent concussion, than the others.

I am not an engineer, and therefore offer no opinion as to the method by which the desired end may be accomplished, but being in the habit of conversing with numerous fellow sufferers and complainants under the present state of things, and hearing various contrivances discussed, it may be no harm to mention one or two as examples.

It has been suggested that the seats might be detached from the carriage body, placed upon higher and stronger spiral springs than are now used for cushions, and kept steady by guiding rods, the holes through which these pass being surrounded with a thick packing of india-rubber. Another plan is that the carriage, instead of being directly attached to the springs above the wheels, should be so constructed as to hang within an outer frame. Say, for instance, that the sides and top of this outer frame should be a light trellis work of wrought iron or wood, and that at every point of intersection in this trellis work, from the top, ends, and sides (exclusive of the door spaces) springs be attached, after the manner of boiler stays, and connected with the internal frame or carriage proper. As, besides the interior, the doors only of the inner frame would be visible, no further finish would be needed for them. They might be much lighter than the present carriage body, as well as roughly made, and the saving thus effected would go towards paying for the external trellis work and springs. If these springs could be made of india-rubber, or some other non-conductor of sound, another advantage would be gained by lessening the noise which at present is so distracting to nervous people. Whatever may be the value of these suggestions, and perhaps double external springs might do much, it seems plain that it is the interest of railway proprietors to make the habitual use of their roads possible:—whereas it appears, from the Board of Trade returns, that there were fewer season ticket holders by 2,000 in 1860 than in 1859. If these be taken at only £10 each, it would show a loss of £20,000 clear profit in one year, but it should also be remembered that country residents travelling daily to town invariably bring more occasional passengers than any other class of persons, because, besides other members of the family, no town acquaintance can be brought home to dinner without first feeding the railway. It is impossible, therefore, to calculate the real loss sustained by any diminution of the home traffic, and in accordance with self interest, it would be wise to offer a premium for the carriage which shall combine the least possible amount of jar with the least possible degree of noise.

Perhaps all that need be rigid and hard in a railway carriage is the framework on the wheels, on which pillars supporting a rigid roof might be placed. From these roofs, could be suspended, by elastic ropes, light flexible compartments, all the sides and seats of which could be padded and soft, so that in case of ordinary concussion (and a complete smash is the rare exception) passengers, not driven against each other, could scarcely experience a blow harder than might be received from a boxing glove, and thus would be afforded a great preservation from personal injury. These carriages might be more expensive in their original construction than the present coach-carriage, but not materially so; they could not sustain nearly so much damage either from ordinary wear or from collision, and the saving of compensation to injured passengers would be considerable, even were not the comfort of the traveller, or a still more important consideration, the preservation of life, taken into account.

An auxiliary means of affording greater ease with less noise, might be simply to cut the rails in a slanting direction, so that the joints would be oblique instead of square, which would go a great way towards diminishing the continual jar at the points of junction. The amount of depression at the joints may also be decreased, and the process of fishing, as it is termed, superseded,—and therefore the cost of fixing the rails lessened, whilst much of the expense of relaying might be saved,—by substituting for the wrought-iron bars on chairs at present in use, strong longitudinal beds of cast-iron, having grooves into which light wrought-iron bars with steel surfaces might be inserted, so that the more expensive tough metal required to take the wear may be easily replaced in the grooves. The cast-iron beds, having no friction, would last a very long time if protected, as they easily might be, from oxidation.

The improvements which have been pointed out being requisite for first class carriages, how much more must they be for second and third class? The same substantial comfort would, I conceive, be provided for all under judicious management, for granting that luxurious exclusiveness should pay an additional fare, it can be none the less true that it is the attraction of numbers, rather than of the wealthy few, which must be aimed at if traffic is to be largely increased so as to make railways pay. What is wanted is, greater facility as regards personal comfort, reasonable speed, and frequent trains, in order to induce a multitude of travellers habitually to use the road. If the conditions of cleanliness and decent behaviour were enforced, as they ought, it would appear unnecessary to employ third class carriages at all. Surely to incur the extra expense of running separate third class trains because the passengers pay less, is something like “cutting one’s nose to spite one’s face.”

In winter much suffering from cold might be avoided by turning the spare steam not wanted for blast, into tubes fixed along the floors of the carriages, which might be rapidly connected from one carriage to another by means of flexible joints; and since the draft of this paper was written, I have been pleased to hear that the system of warming the carriages has been introduced on the London and North-Western Railway, as it had previously been on the continent.

The carriages should be high enough for tall men to stand up with their hats on, and they should be well ventilated at the top, so that the windows may be shut, whenever desired, to exclude cold or dust. Dust in summer is not only a nuisance to passengers but a great expense to companies, damaging the carriage linings, the bearings of the wheels, and most important of all, the engine, but it might be almost entirely prevented by laying gas tar asphalt throughout the line, and this would further save waste to the permanent way both in wet weather and dry.

A very great source of annoyance to travellers in general is experienced from tobacco fumes, produced by the few whose conduct is governed by sensual appetite. They

not only render their companions uncomfortable, but leave the sickening odour for future occupants of the carriage. Even to ask a fellow traveller whether he objects to be smoked upon, is in my opinion, a piece of ill-breeding. The very question forces upon him at least the probability of annoyance. He may endure that which is disagreeable, and by his consent become accessory to the annoyance of those who may come after (for stale smoke is even more annoying than fresh), as well as to the unfairness of injuring the company's property; or by expressing dissent, he may do that which appears ill-natured towards the individual who asks permission. It is obvious that either alternative might be exceedingly distasteful to a well-bred person. For the protection of the shareholder's property, to say nothing of their customers, the directors of all companies ought either to put down this practice with a strong hand, or provide special accommodation for smokers, as is done on some lines. One compartment of each carriage, lettered "Smoke," would answer the purpose. If companies have not the power to make a stringent by-law, they should obtain it from Parliament. The infliction of a pecuniary fine is not sufficient. The rule should be, that any one found smoking in an ordinary carriage be summarily ejected, and left to await the next train. The guard who allows a smoked carriage to leave the last station for taking up passengers, without a report to the inspector of such ejection should be dismissed. The tickets being collected at that station, would give the opportunity to test every compartment, and if, on the discovery of smoke, there be several persons who deny all knowledge of the offence, each one should be *ipso facto* deemed an offender, and turned out accordingly. Between the last station and the terminus, should smoking take place, it might be detected by the train being occasionally stopped, without notice, to catch culprits, as there is nothing like summary justice in these cases. Under such rules there would soon be an end of smoking on railways.

The chief condition of comfort, after all, is safety; therefore it behoves railway managers to inspire confidence by every means in their power. The two fearful accidents which have occurred during this year have been somewhat alarming, and the majority of all accidents tend to prove that irregularity in the traffic is productive of danger. Although the method of telegraphic communication recently recommended by Captain Tyler may do much, yet perfect regularity ought to be the aim of every line. Hence there should be no extraordinary excursions.

With regard to the method so ably advocated by Mr. Wrigley, of keeping on the danger signal perpetually, so that no train might pass without leave, there has been much controversy, and the presumed loss of time has as yet been successfully pleaded against its adoption, because it is said, to stop the train, steam must be shut off before the signal is sighted; but it may be doubted whether there be any ground for this presumption. At any rate, the loss would not be so great as is perhaps anticipated, considering the increase of power gained every moment whilst the steam is shut off.

A strong light is a desideratum in preventing accidents at night. For this purpose, I am told that if a lens were placed in the door of the locomotive smoke box, just beneath the chimney, and protected from the heat by a sheet of mica, a far more conspicuous light would be obtained without cost than from any lamp yet used. Even timed iron reflectors from the bottom of the fire box would throw a stronger light than any lamp. At the stations, coloured lights are now used, denoting safety, caution, and danger, but in a mist these can hardly be distinguished, whereas were one, two, or three lights substituted—the gas for which might be turned up and down by the signal arm itself—much greater security would result. In addition to this, turning up the whole of the station lights as soon as the whistle is heard* might be made an "all right" signal, to be turned down again as soon as the train is passed.

* A speaking trumpet directed before the whistle would convey the sound three times as far.

Communication between the guard and driver has at length been accomplished on many lines, after much public clamour, but it might have been effected by a more simple plan. The experiment was once made by a sub-engineer, of placing a mirror, in view of the driver, at an angle, in front of each side of the engine, so that the whole of the two sides of the train were shown at a glance. The result is said to have been that an object thrust out of any window caught the driver's eye, without his turning the slightest attention from his look-out ahead. It was impossible to avoid seeing it, so that in case of danger—fire especially—a number of hands or handkerchiefs shown from any carriage, would afford a most satisfactory signal. Unfortunately, the chief engineer was somewhere on the line when the experiment was made, and immediately ordered an innovation introduced without his authority to be suppressed, and nothing more has been heard of the signal mirror; which, by the way, might probably also serve for light reflectors for the back of the train at night.

Notwithstanding all that can be said about accidents, it must be admitted that railway traffic has hitherto been carried on with wonderful security to life. Thus in 1860, out of 163,435,678 passengers (47,894 of whom were season ticket holders, reckoned as one each), 30 only lost their lives from causes beyond their own control, (20 of these deaths were from two collisions), and 479 were injured; which is in the proportion of 18 per 100 millions, or 1 in 5½ millions passengers killed, and not quite 3 per 10 millions, or one in about 350,000 wounded. Yet this was a high rate, the average killed for a number of years being about one in eight millions.

The Returns of the Registrar-General show that the deaths by violence of all kinds average about one in 1,250 per annum. Of course it would be incorrect to compare the risk of those exposed to danger for a short period with those so exposed during the entire year, but by a return with which I have been kindly furnished from the South Western Railway, it appears that in 1860 the average payment of all passengers on that line was 1s. 9d., which would pay for a journey occupying about 40 minutes, or the 13,000th part of a year. Now as one in 5½ millions of all railway passengers were killed in that year, it follows that supposing persons travelled without intermission day and night, the death rate would be 1 in 420 per annum. In other words—according to the doctrine of chances, a person must thus travel incessantly for 420 years before his turn to be killed will arrive. The ordinary death-rate of the country by violence, as has been stated, is 1 in 1,250; but as people are scarcely exposed to danger when quietly at home, or, in general, when sleeping, it would be fair to take the common exposure at eight hours a day. The average risk, then, by violent deaths, among all classes of the community, is about the same as among railway passengers in proportion to the duration of their exposure. Calculated according to the same method (taking the risk at forty hours per week), the proportion of fatal accidents in collieries is seven times greater than in railways; yet casualties in mines are seldom heard of except in such cases as Lund Hill and Risca. So, also, the deaths by burning (chiefly among infants) are one hundred times more numerous than by railways (it is difficult to estimate the period of risk, without which the proportion cannot be calculated), but it is only when actresses or noblemen's daughters are the victims that such horrors ring through the country. In like manner, volunteers and sportsmen are now and then accidentally shot; skaters are drowned; and sometimes persons are suffocated in their beds by poisonous vapours, or even crushed under falling buildings; but nobody thinks of abjuring his calling, his recreation, or his rest, because in every situation of life the risk of accident impends. Indeed, it would be almost as wise to refuse to live for fear of death by violence of some kind, as to abjure the use of railways for fear of a fatal result. The relative propor-

tion of persons injured on railways, as compared with those by other accidents of some kind, serious or trifling, cannot be guessed at, but we may take for granted that every scratch is made the most of.

Railway managers should have their due, as well as other offenders, whereas, in regard to compensation for accidents, they have been very hardly used. It appears monstrous that a sum of £13,000 could have been awarded to be given by a company to the family of one man, who had paid no higher fare than his fellow-passengers, because he happened to be wealthy. For that very reason, if he desired to insure a large compensation in case of death, he should pay a premium proportionate to such assurance. There is no justice, but clearly the contrary, in compelling shareholders to suffer for the accident of conveying a man of wealth, which the company could have no means of knowing or guarding against. If this state of things be not altered, companies must, in self-defence, either make a sliding scale of charges in proportion to the passenger's property, attested by declaration on the ticket issued, or decline altogether to carry wealthy men. Let the companies pay, by all means, but let the amount they pay bear some fair proportion to that they receive.

A system of insurance might be organized, the company being bound to deliver the passenger safely at a fixed rate, or pay a fixed amount as compensation, and to take insurance at a reasonable charge, for extra sums say one farthing per £1,000 which is $5\frac{1}{2}$ times the risk; as it has been seen that fatal accidents to passengers, under proper management, do not amount to one in $5\frac{1}{2}$ millions.

If irregular excursions be discontinued, as they ought, it must be by making all regular trains practically excursions. The fares should be so low as to be a standing inducement to pleasure seekers to use the road at every opportunity that may offer, not only during seasons of recreation, but whenever temporary cessation of business might allow. Excursion fares have hitherto been lower than necessary for this purpose; nevertheless, even these pay, as is proved by their being continued notwithstanding the disadvantage of extra expense in advertising, additional labour, &c. The mean to be aimed at should probably be something between the present excursion and ordinary third-class fares, the proportion being greater for short distances, and less as the mileage increases. One can now go to Brighton and back, on Sunday, 100 miles, for 2s. 6d.; but suppose the opportunity were offered by every train during the week of taking the same journey for 5s., nobody having inclination and time to spare, would be deterred from going by the expense, and the cost of the extra excursion trains would be saved. The great body of the people never cease to seek recreation of some kind; sensual pleasures are at present most easily procured; nevertheless, were it within reach, travelling to see the country, or to visit distant friends, is even more seductive, and would be readily resorted to on all occasions were the temptation always present, and the change would tend very much not only to the elevation of public morality, but to the improvement of railway dividends. On such a plan not pleasure-seekers alone, but business men of every kind, would oftener visit distant marts, travelling also between provincial towns and villages, as well as to and from important centres; and trains being naturally more frequent, greater facilities would be offered to suburban residents.

At present horses on some common roads can beat rail and steam. This is proved by the fact that numerous loaded vans are, during the summer, daily driven from Bristol to the little watering places of Clevedon and Weston (distances of 14 and 20 miles), filled with excursionists, because the fares on the Bristol and Exeter Railway, which goes to both towns, are from sixpence to a shilling higher than the rates charged by these horse vans. Is it not strange that shrewd men should be able to invest capital in vans and horses for the purpose of carrying mere pleasure-seekers along the very line of railway and make it

pay? It is evident that if this can be accomplished in one locality, it could in the neighbourhood of almost any line as at present conducted.

Considering the fact that the expenses of getting up steam and working a train are nearly the same whether the carriages be many or few, whether they be full or empty, and therefore that every additional sixpence received is almost all clear gain, it is remarkable that in this practical age the immense resources at the command of railway companies, from a profitable use of the land in their possession hitherto lying idle, can have so long been unperceived. Incalculable losses have been incurred by the construction of branch lines to unimportant towns, without any effort being made to obtain an increased population either in these towns and villages, or along the lines themselves. Hundreds of acres belonging to the companies have been turned into mere waste, which, converted into building ground, might have been, and might yet be, rendered highly profitable. Granting that there may be companies unwilling, or who have no power to build houses for tenants merely as such, there is at any rate nothing to prevent them from providing cottages for their own servants, who might occupy these houses as part of their wages, and the men might be conveyed by early and late luggage trains to and from the stations at which their services are required, with scarcely any expense to the company. The effect would be that every servant would derive a benefit much greater than the difference of wage, which would be saved to the management. They would breathe the pure air, and be enabled to purchase country produce, each of great value in the maintenance of health, and the provision for their families, whilst the shareholders might get a large per centage on the building capital by the consequent deduction from salaries in lieu of rent.

Irrespective of peopling the companies' own land, the increase of population in the neighbourhood of each station ought to be assiduously encouraged. This might be done by the judicious application of the annual ticket system. The citizen is carried three miles in an omnibus for sixpence. The railway might carry him 30 for the same money, within the same time. Is there any doubt which tens of thousands of sensible men would choose, provided that easy carriages were contrived and brought into use, and numerous trains to give choice of time provided? When it is considered, moreover, that according to the same proportion he might go ten miles for two pence, or five for a penny, can any limit be imagined to the number of country-living townsmen that might be produced? At present, the ticket almost equals a second rent, and when taken the labour of using it is so great that an escape from the journey is regarded as a holiday, and the experiment is often not renewed.

Annual tickets for ladies and children might be even more remunerative, in proportion, if charged at about a fourth or sixth of the rate of those for gentlemen, because they would probably not be used more than one-tenth as often on the average;—nevertheless, they are indispensable to the full development of home-passenger traffic.

The time occupied at the end of a journey by taking the tickets is a matter of frequent complaint with travellers to whom a few minutes is often of much importance, and it is sometimes remarked, that were the system adopted on the American railways, and indeed on some of the Manchester lines, of taking, and even selling tickets by the guard during the journey, time would be gained, and the staff of the station clerks might be sensibly reduced.

There are many matters of detail well worthy the attention of directors desirous of promoting the comfort and convenience of passengers, with a view to the companies' interests. The care of luggage is a source of anxiety from which many would gladly be relieved. The company might easily take charge of it for a fee of 2d. per package, a receipt for which, being handed to the

passenger, the luggage might be delivered at its address in exchange for such receipt, and this might yield a considerable revenue to the company. The charge of 2d. for merely keeping a package, coat, or umbrella, is extortionate, and defeats its object.

Again, the building of comfortable hotels at leading stations and places of public resort,—let at nominal rents, on condition that the tariff of charges be reasonable,—would do much to encourage pleasure trips; for the present exorbitant scale of hotel charges often prohibits travelling. These establishments, however, should be of moderate size, as when building is overdone, all other expenses being increased in proportion, failure must result, which tends to repress experiments in the same direction elsewhere.

It may be thought hopeless to expect any great reform in railway management without a considerable alteration in the composition of Boards of Directors, who are too often chosen apparently for no other reason than that their manifold engagements of a public or private nature (*e.g.* as Members of Parliament or heads of large mercantile establishments) must of necessity prevent their giving any real attention to the Companies' concerns, which must therefore be almost entirely left to traffic-managers, engineers, and secretaries. Surely three or five respectable men of business, with an efficient working staff, would conduct the traffic to much better purpose. They should devote their whole time and be well paid for their services, subject—in common with the leading men of the staff—to fines, limited to one-third of their salaries, for all compensations for accidents; so as to render them personally and pecuniarily responsible. At all events I think it must be concluded that any substantial improvement in railway property must be looked for from more responsible management; from diminished traffic expenses, and wear and tear; from legislative justice between the proprietor and the passenger; from reasonable, without unreasonably cheap, fares; and—the essential point—from security of comfort to the traveller; which may encourage a large increase in pleasure-seeking, as well as business journeys, and also in regular home traffic for residents within many considerable *radii* of every large town.

DISCUSSION.

Mr. CARTER was impressed with the belief that if every train consisted of first, second, and third-class carriages, with an interval of not less than half an hour between each train, there would be more security, and the public would be better accommodated. If a man submitted to travelling on a hard seat for the sake of a low rate of fare, he saw no reason why he should not be carried at the same speed as those who paid for the comfort of sitting on a well-stuffed cushion. He thought third-class carriages ought to be attached to every train.

The Hon. OCTAVIUS DUNCOMBE (responding to the invitation of the chairman) hoped he might be allowed to say, as a railway director, that he must not be expected to give his opinion in favour of the sentiments he had heard that evening. With a great deal that was stated in the paper he cordially concurred, but with much he most materially differed. Railway directors, he thought, had not a great many friends. He had the honour of being a director of what he might, without any particular pride, say was one of the best managed lines in the kingdom—the Great Northern; he, nevertheless, had frequent complaints from his friends on all sides, not only as to the punctuality with which the trains arrived at their destination, but also as to the times at which the trains started, and he invariably said to them: "You, as part of the public, will never be satisfied till the trains start at your own hours, carry you at your own speed, and carry you for nothing." He was quite sure that, although railway directors frequently deserved censure, yet, in his opinion, they did not receive, on the part of Parliament and the public, that

measure of support to which they were justly entitled. Mr. Baker had alluded to the case which happened on the Great Northern Railway, in which it was decided that the Company should pay £13,000 as compensation for the death of a single individual. Now, if these decisions were to be held good, he was certain that railway proprietors must not look for large dividends; for if a wealthy man, paying no higher fare than a poor man, happened to lose his life on a railway, was it just that his family should receive an amount of compensation in proportion to his wealth? He was sure the law, as administered under Lord Campbell's Act, required some revision at the hands of Parliament.

After a few words from Mr. VARLEY,

Mr. BARNETT BLAKE said two or three conclusions had been advanced in the paper which he thought the meeting generally would not agree with. As to the practice of smoking, it should be borne in mind that those who indulged in that habit contributed a large amount to the annual revenue of the country, and in railway travelling it was easy to get rid of the nuisance by setting apart a carriage for smokers. With reference to excursion trains, he believed it would be almost impossible to reduce the ordinary rates of fares to those which were adopted for excursions, and if these trains were abolished, much real benefit to the public would be lost. When they could come from the north of England and return for 10s. by an excursion train, he saw no reason why it should be done away with. He thought the primary error in railway management was this, that directors commenced their duties under the impression that as commercial men they were holding in their charge the property of those who were shareholders, and their whole object was to secure good dividends for them, whereas, if they considered themselves as trustees on the part of the public, to secure as far as possible the safety and comfort of the travelling community, the profits would follow more surely than they did under the present system. A gentleman who had just spoken had referred to the Great Northern as one of the best managed lines in the kingdom. He (Mr. Blake) did not suppose that either the directors of that line, or those whom they employed, would descend to any trickery; yet they did not hesitate to carry persons many miles out of their way to prevent them going by another company's line. [Mr. Blake, with considerable humour, gave numerous instances of the inconvenience suffered by himself and others, owing to the rivalry of railway companies.] Those were cases in which the competition of companies was carried to such an extent as to disgust the public. The real secret of success in railway management would be to establish a Government supervision to prevent the public being made a market of. Mr. Blake went on to point out instances of railways which, having adopted the lowest fares and afforded the greatest amount of accommodation to the public, became highly remunerative lines. He also referred to the inconvenience to which the public were subjected owing to the want of proper regulations for the interchange of traffic between various companies, which resulted in a great deal of annoyance and the loss of much valuable time.

Dr. ELLIS thought the fundamental error in the present system of railway management consisted in directors undertaking a multiplicity of occupations, in most of which they had had no previous experience. How could a man be at the same time an engineer, a builder of locomotives, a coal merchant, a coke burner, and a clothier, with all the other various branches of trade involved in the construction and working of a railway? It was not to be expected that any body of men of the class from which railway directors were generally selected, could possess all the varied qualifications which he considered were necessary for successful railway management—the success being measured by the amount of profits they secured to the owners of the line. He submitted that the functions of a railway board of direction ceased as soon as they had constructed a line from

one point to another, and that, after that, the providing of locomotives and rolling stock, and the conducting of the traffic, should be transferred to the hands of other persons, who had had previous experience in such matters.

Mr. P. H. HOLLAND thought the system recommended by the last speaker would not tend to diminish the risk or to improve the comfort of railway travelling. They might imagine the state of things which would exist from the traffic being conducted by a number of contractors who were to start trains at their own hours, and run them at their own speed. Under such a system the casualties of travelling might be reckoned at 1 in 500 instead of 1 in 5,000,000. The great error of the present management consisted in persons undertaking the office of directors without being remunerated in a way which would induce them to give up their time and attention to the duties they undertook. Having travelled a great deal on railways, he could fully substantiate the statements of Mr. Blake with regard to the annoyances and delays occasioned by the rivalry which at present exists between competing companies for the traffic of various districts. Neither company gained any benefit to itself, whilst the public were exposed to all the annoyances arising from such a system. He submitted that an easy remedy was at hand. They were told that the cost of locomotive power was 1s. per mile per train. That was the rate of expense on the Brighton line, and might be taken as a fair average; how easy then it would be to increase the number of trains, because at such a rate there was no pretence for saying companies could not afford to do so. At the present time, passengers paid a higher fare for the sake of being conveyed from one large town to another at a quicker speed, without stopping at small intermediate stations; but, looking at the infrequency of these fast trains, much of the benefit was lost, as one might have to wait a couple of hours before an express train started, and therefore a saving of time would be gained by travelling by an ordinary train, although it was half-an-hour longer in performing the journey. He did not hold with the doctrine that railway directors were trustees solely for the public accommodation, but he considered they best discharged their duties to the shareholders, as a commercial body, by consulting as far as possible the interests of the public, who were their customers, and that this was the only way of making good profits for the shareholders.

Mr. RICHARD TILL said, after the remarks which they had heard that evening, a man must be bold to avow himself a railway director. That was, however, his position. The discussion had not been of the practical nature he had expected, but had turned rather upon local interests and individual disappointments in reaching particular places, showing how easily, if only the speakers were directors, things could be managed, and that, instead of all the inconveniences spoken of at the points of junction of competing lines, people should be carried direct, without hesitation or delay. They had been told that gentlemen who undertook the functions of directors were unfit for them, because they had other duties to perform, were not specially educated for this work, and were therefore obliged to employ persons conversant with the various minutiae of the undertaking. He thought that, according to such a doctrine as that, the great manufacturing and trading interests of this country would be set at naught. Who was it who undertook, with credit to themselves and profit to the shareholders, the direction of companies engaged in large nautical operations? Who but the merchants—commercial men—not brought up to the sea; men who had learnt their trade not on shipboard, but in the general marts of commerce; who were associated with practical men who acted under them, and advised with them. What would the Peninsular and Oriental Company have been if it had been governed entirely by naval men, instead of by commercial men? It was so with railways, and so far from heaping calumny upon directors, he considered the management of so mighty an undertaking as the railway

system of this country, which carried so large a number of people, with so trifling an amount of casualty and loss of life, reflected upon them the greatest honour and credit. To say that there was any great undertaking in this country that some one could not carp at would be absurd. It was in the common course of things, that nothing could be done perfectly, and however well a thing was done, some one would be sure to imagine it could be done better. They were indebted to Mr. Baker for many excellent hints. He joined in the surprise that had been expressed that improvements had not been introduced in the construction of carriages, which would afford greater accommodation to the passengers. He considered railway directors were placed very much in the same position as tradesmen and shopkeepers. It was their business to encourage customers, and to give them every possible facility and accommodation. Anything which tended to that would tend to the prosperity of the undertaking. He wished Mr. Baker would offer himself to any of the railway companies—not, perhaps, to the Great Northern, which was already so well managed—but say, for instance, to the Eastern Counties, with which he (Mr. Till) was connected. He was sure they would hail his assistance with the greatest pleasure. He begged, as a director, to offer his thanks to Mr. Baker for the many useful hints he had thrown out, and he hoped they would, when published, be read with profit by the railway world in general.

Mr. WILLIAM HAWES would not, in the observations he should offer, enter into the question of railway grievances. The charges had been made and ably replied to by the gentleman who had just sat down, but there were two or three principles enunciated in the paper which he thought required notice, because he entirely disagreed with them, and he thought they ought not in a Society like this to pass unchallenged. They were told that continuous railway travelling was essentially injurious to health, and that persons who had been in the habit of travelling daily had been obliged to give up their country residences and come back to town, and the name of an eminent physician (Dr. Southwood Smith) had been mentioned as one who endorsed this doctrine, but Mr. Baker did not tell them that that gentleman lived close to a railway, and went backwards and forwards on it almost every day of his life, and he believed had done so for some years past, without appearing to suffer from so doing. But this was not a question to be put upon individual cases. No doubt, in certain states of health, and to certain temperaments, constant railway travelling, like many other things, might be injurious, but the question was, whether railway travelling in moderation, and within certain limits, was injurious? He believed the practical result of millions of persons travelling every day was the best answer that could be given, and was more satisfactory in itself than the statement of any individual person. Then, another important principle was involved in the remarks made on accidents. In the first place they were told that trains at short intervals were a great source of accident, and a little further on they were advised to increase the number of trains. Which statement was to be relied upon? He believed it was not the short interval between the trains which was the cause of accidents; he thought if they had trains every five minutes throughout the day, with an adequate staff, there would be fewer accidents than if the trains were less frequent, because the more closely the *employés* were kept to their work the better it would be attended to; but if a man was called upon to do a certain duty once in every two or three hours, accidents were more likely to occur at those long intervals than if the trains passed more frequently over the lines. Then another principle had been enunciated on the question of compensation for accidents. He contended that the verdict for £13,000, in the case of the Great Northern Company, was a correct and honest verdict. He was prepared to say that if a railway company, through gross negligence of its servants, through

want of proper care as to the state of the rolling stock, or through any of those casualties which, by ordinary attention, could be prevented, brought about an accident, and if a family were, through that accident, deprived of the means of support, that family had a fair right to go to the company and ask for compensation. But if the accident arose from those unavoidable causes to which all undertakings were subject, and if the railway company proved that there was no carelessness or want of caution on their part, he did not believe any jury would give a verdict against the company—nor would they, under such circumstances, be legally liable for damages. It was, in his opinion, taking a wrong estimate of railway management, from a traveller's point of view, to say that the loss of a family was not to be estimated by that of which they had been deprived. Passing to another subject, it was suggested that all trains should be excursion trains, and that the fares should be brought down to that level. He thought that suggestion arose from a want of knowledge of what an excursion train was. Mr. Baker had suggested a standing fare of five shillings to and from Brighton as a medium rate. Now, what was an excursion train? It was put on at a time when the great manufacturing and labouring classes could spare time for the holiday—when the poorest but most industrious part of the population could take a day's amusement. Therefore, to double the fare in order to give advantages to another class of passengers, would be to deprive the working man of one of the most important public benefits of railways, and to injure a class of the community which was now greatly benefited by the excursion traffic. Another gentleman had suggested that a Government Board of Management should be appointed. He thought that, in the present advanced state of public intelligence, and before such an audience, no man would be bold enough to advocate that any of the great public undertakings should be handed over to the management of the Government. Was there ever any Government Board, or did any such body exist at the present day, in which economy was a ruling principle, and by which the greatest amount of convenience was given for the smallest expenditure? He contended that no general Board could surpass the present management of our great public companies, and of the great lines of railway in this country. They were likewise told that railway directors could not do their duty because they were not clothiers, and at the same time practically acquainted with the construction of railway rolling stock. Did any one doubt that the Duke of Wellington was a great general because he knew nothing about the cloth of which the uniform of his soldiers was made? Would anyone say he was unfit to direct an army, or to manage a commissariat because he knew practically nothing about forage or clothing? He knew how they were obtained, and employed proper persons to obtain them, but it was another thing to say he understood the quality of the leather and the cloth that were used in the equipment of his men. It might, perhaps, be true that he had that gift which few men have, of being able to grapple with a vast amount of details whilst he kept the command of his army, but to say that the managing board of a company was unfit for its duty because individual members were not acquainted with the details of every article which the company used in its business, was an absurdity in itself. Directors were appointed to select the best working staff they could obtain to manage the details of the business, and their duty was to see that those details were carried out with economy and efficiency, so as to produce the greatest amount of benefit to the public and to those who had entrusted the management to their hands.

Mr. REYNOLDS, in allusion to the two frightful accidents that had taken place this year, expressed his surprise that the simple practical suggestion which was made at the time, of placing between the carriages and the engine a break van filled with faggots or some other resisting substance, had not been generally adopted. He would strongly

urge some such plan as that upon the attention of directors, as a means of mitigating the consequences of a collision of trains.

Mr. ALEX. BEATTIE said, he and other railway directors present were much indebted to Mr. Hawes for the observations he had made. They had unfortunately been pretty well attacked for their deficiencies, and he also felt much indebted to Mr. Baker for some of the remarks he had made; but he could not believe he was right in assuming that railway travelling was injurious to health, inasmuch as for the last fifteen years he (Mr. Beattie) had been in the habit of travelling two hundred or three hundred miles per week, and he was not conscious that during that period he had suffered from it. Persons who suffered from sun-stroke in India would probably be unequal to a railway journey daily, but he thought those instances ought not to be taken as examples of the effect of railway travelling upon the public in general, and he thought the increasing traffic was sufficient to satisfy Mr. Baker that there was no reason to apprehend that, generally speaking, railway travelling was injurious to health. With regard to the issue of tickets, Mr. Baker had suggested that they should adopt the American practice in that respect. If there were any improvements to be derived from America, he was sure directors would be happy to adopt them as far as possible; but for his part he thought there was nothing in railway management more injurious than allowing the guards to collect the fares. It was found to be attended with so much moral injury to a high class of servants that the practice had been discontinued on one of the lines in Canada. The mode in which the American conductors moved about the carriages would not be acceptable in this country, and was impracticable with the present division of carriages into compartments. They might adopt the French or German system, where the guards travelled along a platform to collect the fares; but in this country the rate of speed was too great to render this a safe operation. A great deal had been said as to the inconvenience occasioned to the public by the delays at the junctions of competing lines. The public ought to be a little more reasonable than to suppose that the trains could be made to fit in with the exactitude which some people expected. Directors were most anxious to give all the facilities in their power, and he thought if the legislature had been a little more careful in the mode in which they granted powers for the construction of railways, the directors would not at the present time have been prevented from reducing their fares, which was rendered impossible by the competition which had been sanctioned. The railway with which he was connected (the South-Eastern) was now suffering from an act of the legislature in permitting another company to run into the very territory they occupied, at a time when there was not a sufficient development of traffic to enable them to pay a fair dividend to each company. He would therefore ask for a little more charity towards railway directors than had been displayed that evening.

Mr. TEULON, in reference to the question of cheap fares, adverted to the case of the Greenwich and Croydon lines, showing that when the latter company raised their fares, in order to cover the toll which they paid to the Greenwich company, they lost a great portion of their traffic—so much so that they actually considered the advisability of shutting up the line, but the shareholders insisted upon resorting to the alternative of reducing the fares to 6d. less than was originally charged as the fare to Croydon, the result of which was that they had an amply remunerative traffic. With reference to the suggestion that the ordinary traffic should be conducted upon the principle of excursion traffic, he would remark that excursion trains were appointed for particular days, and immense numbers of people availed themselves of the reduced fares, but that would be impossible as an every-day occurrence. It was impossible to run frequent trains at low fares unless there were people to fill them. The great reason why the French railways paid so much

better than the English was, that they ran less frequent trains and worked at much less speed, the result of which was that their trains were better filled, and they did not carry a number of empty carriages backwards and forwards. With regard to the subject of compensation for accidents, it was quite true that, as the law now stood, if an accident was proved to have been occasioned by causes beyond the control of the company, they were exonerated, but they must know that the determination of that point depended entirely upon scientific evidence, which was unfortunately purchaseable, and he thought it would be well if the Board of Trade appointed a disinterested person as assessor in the matter of scientific evidence, as to the causes of accident. He agreed with Mr. Hawes, that the responsibilities of railway companies should not be lessened, but at the same time he thought they ought not to be unduly mulcted in cases where the parties paid no higher rate than other passengers. On the subject of rolling stock, and the comfort afforded to passengers, he would remark, that the easiest travelling carriages were those which were of the heaviest build. The carriage in which Her Majesty travelled weighed upwards of five tons, and one could write or do anything else in that carriage without inconvenience.

Mr. BAKER, in replying upon the discussion, thanked the meeting for the kind manner in which his paper had been received. With reference to the last observation of the last speaker, he would remark that, perhaps the carriages required better springs, as he considered those at present in use were too strong for the weight of the carriages put on them, and that was the cause of their being so very shaky. With regard to fares it must be matter of experiment how far they could be reduced so as to be remunerative. His position was that a great deal might be done in making regular trains practically excursion trains, although they could not expect such enormous trains as were required, after extensive notices had been given to the public. If railway management was so efficient at the present time why did not that property pay the shareholders a better dividend? He had stated that he thought trains should be frequent, and he believed under proper regulations frequent trains could travel with safety. As to the illustration of the Duke of Wellington, brought forward by Mr. Hawes, he would say he apprehended it was not the business of the Duke to make the army of the Peninsula pay, but to make them fight, therefore he did not see the logic of that answer in reply to his observations on the subject.

The CHAIRMAN said they had heard Mr. Baker's paper on a subject of great public interest; they had also heard what had been advanced on the part of the railways, and there could be no doubt that the public were immensely indebted to the invention of railways, from which they received a large degree of accommodation with the least possible amount of risk. They had therefore every reason to be grateful to railway companies; but that railway management was perfect, no one would venture to assert, and the nearer they approached to perfection the greater would be the demands upon them. It was manifestly to the interest of the companies to give the public the utmost amount of accommodation in their power. They were very heavily taxed, and it was to their interest to do all they could to accommodate the public, and there could be no doubt the public were conveyed in a way they never were before. Every year the accommodation was increased. Railway companies were beginning to understand better the multifarious details which were involved in the management, and every year the accommodation was made more perfect, and, as a consequence of the accommodation being more perfect, the demands upon the companies became more severe; therefore they were taxed to give on the one hand greater speed, and on the other hand to give a greater number of trains. Looking to the amount of profits earned by these undertakings, taking them in their aggregate, they did not amount to more than

3 per cent., which was the rate of interest which could be obtained from Government securities, without risk of the fluctuations of trade; therefore they must see it was to the interest of the companies to do all they could to accommodate the public. He was one of those who thought the responsibilities of the companies should not be lessened; but at the same time they ought to give them every encouragement. He quite agreed that the carriages might be improved, and better warmed and ventilated than they were at present. He had travelled on the American lines, and he confessed there were many things there which he should be sorry to see introduced into this country, and he was sure the same feeling would be entertained by the majority of the public, though it was true that on the American railways the carriages were better warmed, particularly those on the Grand Trunk of Canada. He had also seen on the American lines, sleeping carriages, in which passengers could travel all night in the most luxurious manner. These were matters of detail, which he believed would be ultimately arrived at by the companies in this country. He was sure the meeting felt obliged to Mr. Baker for bringing forward his views on the subject, and he believed some of the hints thrown out would not be lost upon the railway companies, and if they could be persuaded to lay aside an undue spirit of rivalry with each other, their business would be greatly increased, and the public would be better served. He concluded by moving a vote of thanks to Mr. Baker.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 18th instant, a paper by Mr. F. Crace Calvert, F.R.S. "On the Improvements and Progress in Dyeing and Calico printing since 1851," would be read.

Home Correspondence.

THE BUILDING FOR THE INTERNATIONAL EXHIBITION.

SIR,—Will you allow me to correct an error which occurs in your report of the few observations which I made at the meeting of the Society of Arts, on Wednesday, the 4th instant? I am made to say that Captain Phillpotts had stated that "certain ignorant persons had represented to the public that the domes, which were considered the most beautiful features of the building, were not to be seen from the south front." What I really stated was in accordance with the Captain's observations, namely, that "certain ignorant persons had represented the building as if the domes could be seen from the south front."

I am, &c.,

HENRY OTTLEY.

13, John-street, Adelphi, Dec 12.

STEERING OF STEAMERS.

SIR,—Without discussing the whole of Mr. Leigh's propositions, I should like to inform your readers that the plan for steering paddle vessels by the separate action of the wheels has been in use, to my own knowledge, in the boats on the Mississippi river for more than six years, and probably for a much longer period. It is, therefore, practicable for river steamers; whether it is so for sea-going vessels is a point I think yet to be determined; it certainly is not without some efficient means of governing the engines more than those in general use.

With regard to screw vessels, the question of steering is of immense importance, and I would respectfully suggest to some of our wealthy and practical members whether a series of experiments on models might not show that the rudder is *not* the best means of steering that class of vessel. Inasmuch as the screw, representing as it does the

tail of the fish, cannot be attached to a flexible body, as that is, it can therefore *only* be used as a means of progression. But might not the position of the pectoral fins of the fish give a clue to the formation of a steering apparatus which should be more effectual, with less risk of injury, than the present rudder.

I am of opinion that such a series of experiments would demonstrate that nature has not provided those fins in vain.

The *Warrior* now "wears" or turns a half circle in nineteen minutes, and supposing her speed to be fourteen miles an hour, requires a circle whose diameter is nearly three miles to turn round in. This, surely, is evidence enough that something is needed, and something more than the proposed enlargement of the rudder, which, if it gives an increase of power, will as certainly increase the risk of injury to itself, involving, as that does, the probable loss of the vessel.

A few hundreds spent in experiments, where such momentous interests are at stake, could scarcely be called "wasted," and I think it possible that when one or two more striking instances of the inefficiency of the present steering apparatus shall have come before the public, this opinion may meet with more general acceptance.

I am, &c., A. STEWART HARRISON.

133, Upper Thames-street, E.C., Dec. 4th, 1861.

Sir.—Mr. Leigh states that I "deny one fact and do not understand the other." Now his assertion that the helms of the two vessels which came into collision were useless—if in working order, and worked properly—is not correct. No practical seaman will accept it, nor will any evidence on any inquest affect the matter at all. But let that pass.

On the second point, for the joint information of Mr. Leigh and Mr. Reveley, I have, when a very young schoolboy, over and over again repeated the "boat trick," upon which they would so kindly enlighten me. This, however, is not the matter at issue. Mr. Leigh, in his first letter, leads every one to infer that, whatever the velocity of a steamer—8, 10, or 12 knots an hour—his invention would check it instantaneously, and bring the vessel round without her moving an inch forward. This is what I denied before, and still deny. I am quite willing to believe Mr. Leigh's scheme may be of some value as an auxiliary to the rudder, if he can prove that its advantages counterbalance its disadvantages. As he proceeds, I have not the least doubt he will find out what the latter are, and he will come to the conclusion—if he is candid enough to confess it—that the rudder *cannot* be dispensed with.

I am, &c., JAMES KNOX.

Manchester, December 4th, 1861.

MEETINGS FOR THE ENSUING WEEK.

- MON. ...R. Inst. British Architects, 8.
R. Medical, 8½. Mr. Maunder, "On primary Venereal Ulcers; possible sources of error of diagnosis, and the evil consequences of such error."
- TUES. ...Civil Engineers, 8. Annual General Meeting.
Ethnological, 8. Professor Owen, "On the Osteology and Dentition of the Andaman Islanders."
Statistical, 8. Mr. Fred. Hendriks, "On the Vital Statistics of Sweden."
- WED. ...Society of Arts, 8. Mr. F. Crace Calvert, F.R.S., "On the Improvements and Progress in Dyeing and Calico Printing since 1851."
Geological, 8. 1. Professor Morris, V.P.G.S., and Mr. George E. Roberts, "On the Carboniferous Limestone of Farlow and Oretton, Clee Hills, Shropshire." 2. Mr. E. W. Binney, F.R.S., "On some Fossil Plants, showing Structure, from the Lower Coal-measures of Lancashire."
- THURS. ...Antiquaries, 8½.
Chemical, 8. 1. Dr. Bence Jones, "On the simultaneous variations of hippuric and uric acids in healthy human urine." 2. Mr. G. F. Rodwell, "On the solubility of sulphate of lead in hydrochloric and nitric acids."
Linnæan, 8. 1. Dr. Hooker, "On *Welwitschia mirabilis*." 2. Mr. Bentham, "On *Inocarpus*." 3. Prof. Oliver, "On *Hamamelideæ*."
Numismatic, 7.
Royal, 8½.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, November 29th, 1861.]

Dated 16th November, 1861.

2882. J. Booth, T. W. Chambers, and J. Chambers, Bury, Lancashire—Imp. in looms for weaving.
2884. M. Gibson, St. Andrew's Works, Gallowgate, Newcastle-on-Tyne—Imp. in reaping and mowing machines.
2886. D. Stewart, Newcastle-on-Tyne—Imp. in hydraulic cotton presses "worked by steam."
2888. J. Else and T. Godfrey, Mansfield, Nottinghamshire—An improved washing apparatus.

Dated 18th November, 1861.

2894. F. C. Pactow, Manchester—Imp. in machinery or apparatus for raising and finishing fabrics. (A com.)
2896. R. A. Brooman, 166, Fleet-street—Imp. in reaping machines. (A com.)
2898. G. Prodon-Bonneton and M. G. Prodon, Thiers, France—Imp. in means or apparatus for rolling metals.
2900. G. Parry, Ebbw-vale Iron Works, Monmouthshire—Imp. in the manufacture of iron and steel.

Dated 19th November, 1861.

2902. J. Hemingway, Robert Town, Yorkshire—Imp. in machinery or apparatus to be used in the working, "winning," or mining of coal, clay, shale, and other minerals or earthy matters.
2908. R. A. Brooman, 166, Fleet-street—Imp. in breech-loading firearms. (A com.)
2910. F. L. Stott and M. Tomlinson, Rochdale, Lancashire—Imp. in the construction of vessels or apparatus for supplying lubricating matter to mechanism.

Dated 20th November, 1861.

2912. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for cutting irregular and curvilinear forms in wood or other similar substances. (A com.)
2916. W. P. Bayliss, The Lloyd's, Madeley, Shropshire—Imps. applicable to buildings in order to facilitate the extinguishing of any conflagration which may happen therein.
2918. L. Thomas, 9, Union-street, Berkeley-square—Imp. in the mode of manufacturing and constructing wrought iron ordnance.

[From Gazette, December 6th, 1861.]

Dated 29th July, 1861.

1888. F. Tolhausen, 35, Boulevard Bonne Nouvelle, Paris—Imp. in comforters, neck-ties, cravats, and the like articles of garment for the neck and chest. (A com.)

Dated 3rd August, 1861.

1929. G. L. M. Viscount de Ponton d'Amecourt Paris—Imp. in apparatus connected with aerostation.

Dated 19th September, 1861.

2340. W. Clark, 53, Chancery-lane—Imp. in machinery for the manufacture of fishing and other nets. (A com.)

Dated 3rd October, 1861.

2468. J. A. Tannahill, Devon and Cornwall Bank, Truro—An improved apparatus for counting money.

Dated 10th October, 1861.

2531. C. W. Felt, Salem, Essex U.S.—An improved machine for setting, spacing, justifying, and distributing printer's type.

Dated 22nd October, 1861.

2640. H. B. Fox, Liverpool—Imp. applicable to iron and other metallic bedsteads.

Dated 23rd October, 1861.

2646. C. Brison and A. Chavanne, Lyons, France—Imp. in ovens, kilns, or furnaces for manufacturing or other purposes.

Dated 26th October, 1861.

2694. W. Smith, Leek, Staffordshire—Imp. in the preservation of stone, brick, and other such materials used in building, applicable also to the waterproofing of walls.

Dated 29th October, 1861.

2710. R. Gibbon, Royal Brewery, Brentford—Imp. in machinery or apparatus for preparing grain for brewers.
2714. J. Hayward, Everton, Liverpool—Imp. in means or apparatus for raising water or other fluids.

Dated 8th November, 1861.

2804. H. Montucci, 38, Rue du Sentier, Paris—Imp. in apparatus for goffering or embossing stuffs in high relief.
2810. A. B. Berard, 51, Avenue Montaigne, Paris—Imp. in apparatus for separating metals from their ores.

Dated 9th November, 1861.

2816. S. Hague, Nottingham—Imp. in the manufacture of hoes, adzes, or other similar articles.

Dated 11th November, 1861.

2826. W. Tongue, Chryssell-road, Brixton—Imp. in processes for treating, preparing, and combing certain fibrous materials, and in the machinery or apparatus employed for these purposes.

Dated 12th November, 1861.

2834. W. J. Hay, Southsea—Imp. in protecting iron and wooden ships, caissons, dams, and other wooden or iron structures from decay and from fouling by vegetable and animal matters, and in preparing the materials employed therein.
2835. R. Bellis, Chester—An improved method of laying wood floors.
2837. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in bleaching cotton and other textile fabrics or materials, and in the apparatus employed in such process. (A com.)
2838. W. Cooke, 26, Spring-gardens, St. Martin's-in-the-Fields—Imp. in the construction of carriages and vehicles, and in the means of ventilating the same, this part of the invention being applicable also to windows generally, and other such openings.
2839. A. V. Newton, 66, Chancery-lane—Imp. in the construction of dinner plates. (A com.)
2841. W. E. Newton, 66, Chancery-lane—Imp. in skates. (A com.)
2842. W. Tongue, Chrissell-road, Brixton—Imp. in the manufacture of printed yarns and in the application of certain fibrous materials to the manufacture of certain descriptions of yarns and threads.
2843. J. H. Johnson, 47, Lincoln's-inn-Fields—Imp. in the construction of steam or other vapour and water or other liquid tight joints. (A com.)
2845. M. Henry, 84, Fleet-street—An imp. in, and composition for treating iron and steel, and articles manufactured thereof. (A com.)

Dated 13th November, 1861.

2846. T. L. Holt, Brook House, Brentford—A new method of making paper from the cochlearia armoracia or horse radish.
2847. T. B. Collingwood and A. Butterworth, Rochdale—Imp. in throstle and doubling frames for spinning and doubling fibrous materials.
2848. J. Hodgkinson and D. Greenhalgh, Bolton—Imp. in machinery or apparatus for preparing cotton and cotton-waste, or other fibrous materials to be spun.
2849. W. H. Hammersley, Leek, Staffordshire—Imp. in machinery or apparatus for stretching, glossing, and finishing silk. (A com.)
2851. E. C. Kemp, Avon-place, Pershore-road, Birmingham—Imp. in gas lamps, glasses, and other fittings.
2853. L. Rolland, 306, Quai Jemmapes, Paris—An improved spring door shutter with a moveable lever.
2857. C. E. Wilson, Monkwell-street—A new article of female wearing apparel to be worn on the leg.
2863. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of soap. (A com.)
2865. H. R. Fricker, 106, Leman-street, Whitechapel, and J. Manley, Fairmante-street, Truro, Cornwall—Imp. in apparatus for facilitating the cleansing of sewer and other water courses or ways.

Dated 14th November, 1861.

2867. G. Bridge, Bollington, near Macclesfield—Imp. in machinery or apparatus for preparing cotton and other fibrous materials to be spun.
2869. M. Wigzell, Topsham, Devonshire—Imp. in machinery or apparatus to be used in moulding and casting twisted nails, spiral fluted nails, bolts, and screws, for sheathing vessels, ship building, building, and other purposes.
2871. F. R. Hughes, Borrowstounness, and T. Richardson, Newcastle-Tyne—Imp. in treating certain natural saline compounds to fit them for agricultural use, and in order to obtain potash and other salts.

Dated 15th November, 1861.

2875. J. Nixon, Cardiff—Imp. in apparatus for ventilating coal or other mines or other underground excavations.
2877. E. Loomes, Whittlesey, Cambridgeshire—Improved machinery for moulding bricks, tiles, and other like articles.
2879. L. A. Soupert, Brussels—Imp. in the mode of preparing and subsequently tanning hides or skins.

Dated 16th November, 1861.

2883. J. C. Goodall, 12, Great College-street, Camden-town, and J. Beale, East Greenwich—Imp. in machinery for folding envelopes.
2887. R. T. Worton, Newberry-place, Kentish-town—Imp. in pianofortes.

Dated 18th November, 1861.

2891. J. Hawkins, Lisle-street—Certain imp. in bits for riding and driving.
2895. M. D. Rogers, 2, Bow-lane Cottages, Saint Leonards-road, Bromley—An improved chain cable stopper or controller.

Dated 19th November, 1861.

2901. L. Smith and M. Smith, Heywood, Lancashire—Imp. in raising liquids, and in apparatus connected therewith, parts of which are applicable to improving the quality of fermented liquors.
2903. T. Redwood, 19, Montague-street, Russell-square—Imp. in the manufacture of starch and of a vegetable sizing powder.
2905. J. Taylor and T. H. Hepworth, Hyde, Chester—Imp. in equilibrium lubricators for steam cylinders, valve boxes, and other similar purposes.
2907. B. D. Godfrey, Milford, U.S.—An improved boot or shoe with a wooden shank part and a flexible fore part to the sole.

Dated 20th November, 1861.

2911. G. Gwilliam, the Savoy, Strand—Imp. in the manufacture or production of plate glass.

2914. F. Johnson, 12, North-street, Westminster—Imp. in ground or earth screws.
2915. J. C. Croxford, 3, Chapel-row, Exmouth-street, Clerkenwell—An improved mode of fastening doors and for other similar purposes.
2919. E. Peyton and W. Batho, Birmingham—Imp. in the moulds or chills employed in casting corner blocks, dovetail grooves, and other parts of metal bedsteads and other like articles in frames for carrying such moulds, and in tubes for the pillars of bedsteads and other like articles.
2920. J. H. Johnson, 47, Lincoln's-inn-Fields—Imp. in the treatment of zinc ores, and in the apparatus employed therein, which improvements are also applicable to the manufacture of phosphorus. (A com.)

Dated 21st November, 1861.

2922. J. Parkinson and C. H. Minchin, Manchester—Imp. in the "Davy" or other safety lamps for miners.
2926. J. Stubbs, Winsford, Chester—Imp. in apparatus for heating and evaporating brine in the manufacture of salt.
2928. W. E. Newton, 66, Chancery-lane—Imp. in rotary engines. (A com.)

Dated 22nd November, 1861.

2930. W. Hirst, Halifax—Imp. in the manufacture of paste, which is also applicable for sizing purposes.
2932. W. Ambler, Keighley, Yorkshire—Imp. in the manufacture of loom pickers.
2934. G. J. Farmer, Birmingham—Imp. in machinery or apparatus for polishing shoe heels, toe plates, and other articles.
2936. T. W. Davenport and S. Cole, Balsall-Heath, Worcestershire—Imp. in apparatus or machinery to be employed in the manufacture of ornamental and useful articles in papier-mache.
2938. E. Peyton and W. F. Batho, Birmingham—Imp. in laths for supporting bedding and cushions in bedsteads, couches, sofas, and seats.

Dated 23rd November, 1861.

2944. J. Weems, Johnstone, Renfrew, N.B.—Imp. in the manufacture of metallic tubes, and in coating or plating metals.

PATENTS SEALED.

[From Gazette, December 6th, 1861.]

December 6th.	1477. M. Mason.
1455. J. Whines.	1480. J. Langdale, jun.
1464. J. Martin.	1488. C. Stevens.
1472. R. Armstrong.	1520. J. Illingworth.
1473. A. Brown.	1762. C. Maschwitz.

[From Gazette, December 10th, 1861.]

December 10th.	1549. W. Clark.
1493. E. T. Hughes.	1562. A. W. Gibson.
1495. R. W. Smith and D. Scattergood.	1570. J. Dixon.
1499. W. H. Walker.	1574. W. Clark.
1500. J. A. Dunacey.	1579. G. T. Bousfield.
1504. J. Durrant & N. A. Harris.	1580. J. F. Williams.
1505. H. Mason.	1581. W. J. Harris.
1510. J. Napier.	1604. A. L. Le Harivel.
1511. D. Walmsley & J. Rostrom.	1621. W. Clark.
1514. C. Swan.	1633. M. A. F. Mennons.
1521. F. Gregory.	1640. J. Cowan.
1522. S. Cook and W. H. Hacking.	1671. J. H. Johnson.
1523. The Hon. C. Duncombe.	1757. W. B. Adams.
1524. B. Blackburn.	1778. A. Topham, J. Topham, and J. Topham.
1525. T. M. Downing.	1800. Sir W. O. Brooke.
1526. W. Baylis.	1811. J. H. Johnson.
1528. J. Summerscales.	1884. C. E. Amos and J. Francis.
1523. T. W. Wedlake.	1918. J. Wright.
1533. G. Leach.	2613. J. Marshall.
1535. R. W. Pitfield.	2617. W. C. Cambridge.
1547. T. Mellodew, C. W. Kesselmeier, and J. M. Worral.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, December 6th, 1861.]

December 2nd.	December 4th.
2760. G. Spiller.	2808. J. Ferrabee and F. H. England.

[From Gazette, December 10th, 1861.]

December 6th.	2829. H. Wilson.
2794. R. A. Brooman.	2848. W. E. Wiley.
2815. A. Lamb & W. A. Summers.	2879. W. Morgan.
December 7th.	14. M. Wigzell.
2813. M. Henry.	

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, December 10th, 1861.]

December 6th.
2702. J. Hunt.

Journal of the Society of Arts.

FRIDAY, DECEMBER 20, 1861.

DEATH OF HIS ROYAL HIGHNESS
THE PRESIDENT.

It is with the deepest sorrow the Council record the death of His Royal Highness the Prince Consort, the President of this Society, which took place on Saturday the 14th instant, at Windsor Castle.

While the death of a Prince, distinguished by rare intellectual gifts and eminent virtues, is deeply lamented by the nation at large, his loss is more especially deplored by this Society, in whose proceedings he has ever taken a most active interest. Since his election as President, on the 2nd June, 1843, His Royal Highness has on all occasions been ready to aid the Society in its undertakings by the influence of his exalted rank and the sagacity of his vigorous mind, and under his guidance the Society has attained a position of usefulness, of which its past records, of a century's duration, afford no example.

The mighty movement of 1851, with its vast influence on the progress of human industry, was due to him, and although not personally engaged in the Exhibition of 1862, it is well known how deep an interest he took in its success. Without his judicious counsel and influential support it may truly be said that the Exhibition of 1862 would not have assumed a substantial form, and that Exhibition may be regarded as his last undertaking.

In the promotion of great objects the Prince was undismayed by novelty, and his judgment was tempered by a prudence which ensured success.

By his varied attainments, his refined tastes, his enlightened judgment, and his kindly sympathies, he became the honored link between the Crown and science, art, and literature, the ready means by which every judicious measure for the promotion of the commercial and industrial interests of the country was brought under the notice and patronage of the Queen.

His Royal Highness had endeared himself to all classes of Her Majesty's subjects, by the continued exercise of qualities of singular usefulness, and by the devotion of his life to the best interests of his adopted country. He has been taken away, not too soon, perhaps, for his own fame, but in the midst of a career distinguished by services to the nation, the full value of which it is impossible yet to estimate.

Monday next, the 23rd inst., being the day appointed for the funeral of his late Royal Highness, the Society's House will be entirely closed, and no business transacted.

INTERNATIONAL EXHIBITION OF
1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £441,750, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTER-
NATIONAL EXHIBITION.

It will cause no surprise to any one to be told that even the progress and arrangement of the buildings at South Kensington have suffered an immense loss in the death of the President of this Society. It is not necessary to detail at the present moment the numerous instances in which his judgment and decision have beneficially influenced the construction of the building. Within a week of his lamented death he decided the important point of giving an additional access to the building through the conservatory of the Horticultural Society.

The loss which is felt so keenly by the whole nation must, necessarily—merely considered as a great national calamity—seriously affect the prospects of the Exhibition. Rumours have been rife as to the possibility of putting off the Exhibition to another year; although, perhaps, such an act might be considered a just tribute to the memory of His Royal Highness, it is felt that the carrying out of his wishes, and the realisation of his hopes, will more effectually express our appreciation of his worth, and the sense of our loss.

It is satisfactory to be able to report a very

considerable progress in the building during the past week. Three of the ribs of the eastern dome are fixed on the western side, and a fourth, on the side facing the Exhibition-road, is fast rising. Besides these six other columns have had the lowest piece of the rib fastened to them. A portion below the line from which the ribs spring has been covered with boarding, so that the dome begins to assume a solid appearance, and to conceal the interior scaffolding. The great arch over the eastern entrance is being rapidly completed, and promises a remarkably fine effect. The western dome is comparatively still further advanced, the cross ribs which form the stays of the dome being fixed, and the preparations for raising the ribs nearly finished. The northern courts, though still in a backward condition, give signs of advancement. The glazing of the southern courts is completed, and the galleries around are in the course of being covered with felt, so that by the end of this week all this part of the building will be protected from the weather. The contractors have taken advantage of this to construct the necessary drains, and to commence the flooring.

The whole of the eastern picture galleries and towers can now be seen, and their noble proportions fully realised, as the plastering and coving are finished, and the scaffolding removed. Externally, too, the workmen are busy taking down the scaffolds, so that an early notice in the *Journal* will probably record the completion of the front facing the Cromwell-road. The smaller, or water-colour galleries, are in an equally advanced state. The principals of the roof over the great staircase are being fixed.

Her Majesty's Commissioners are to lose the services of their General Manager, Col. Shadwell, who has been ordered to join the army in Canada. His successor has not yet been appointed.

The preparations which are being made in France, to do justice to their own portion of the Exhibition, are said to be of an extended character. By an admirable system of filtering the applications for space, through the hands of persons practically acquainted with industrial details, first in the provinces and then in Paris, they have succeeded in producing a magnificent selection of French industry. Moreover, in order to set off to advantage their Exhibition, they have determined to spare no expense in decoration. Every portion of space occupied by France, whether in the Picture Galleries or in the Industrial Sections, is to be carpeted. Mirrors and girandoles will be hung in every available position, and the great court which has been assigned to them in the south-western part of the building, will be hung with curtains stretched from column to column, shutting off this portion from the rest of the building, and, in effect, rendering it a distinct Exhibition.

EXAMINATIONS 1862.—NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The attention of Secretaries of Institutions and Local Educational Boards, is specially called to Par. 5 of the Programme of Examinations for 1862, as follows :—

5. A detailed list of the Chairman, Secretary, and other Members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1862. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Wherever this is the case, the names and addresses of the members, both of the District Board and of its Branch Boards, must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION.

By P. L. SIMMONDS.

No. XI.—THE NORTH AMERICAN COLONIES.

So much has been done by the various North American Colonies since the notice of their movements and intentions, published in August last, Vol. 9. p. 663, that I am induced to return to that group of colonies to supply the new details since to hand.

CANADA.

Canada was all behindhand at that period, but the colony has so far advanced in its collection that even the war preparations making are not likely to retard or obstruct the transmission of its contributions.

The Legislature having refused to vote any grant for the purpose of the International Exhibition, owing to the poverty of the Treasury, in September, various public bodies in both sections of the province, recalled the attention of the Executive to the beneficial effects resulting from the position held by Canada at the London Exhibition in 1851, and at that of Paris in 1855; dwelling upon the knowledge of the Provincial resources thus diffused over Europe, and upon the tendency which the circumstances had to facilitate subsequent investments of British capital in Canadian securities and enterprises. The argument, carried forward, is strong. If Canada benefited by the displays of 1851 and 1855, when comparatively unknown, and with undeveloped wealth but imperfectly represented, how much greater gain may not be expected to follow an adequate exhibit now? The last few years have brought to light treasures both in Upper and Lower Canada, of which neither had previously the slightest conception; and the memorials to the Governor-General have dwelt upon the duty of bringing her varied means under the notice of the capitalists and traders of the world.

It is, undoubtedly, of the highest importance that the Province should occupy a prominent position in a display to which all other colonies and all nations, great and small, will contribute liberally. On the other hand, it were better for Canada not to appear in the race than to appear minus her laurels. Her former efforts astonished by their unexpectedness quite as much as by their force. Few persons abroad gave Canada credit for aught beyond dense forests and a hyperborean climate; and they were amazed to find her sustaining pretensions which indicated a fine climate, a fertile soil, wealth in mine and forest, and a people who add to energetic industry a full average excellence in the mechanical arts. Things are changed now. For good and for ill, Canada is well-known. She is no longer a stranger in the world. And though capitalists

may well shrug their shoulders when some of her works come under view, still the distant estimate of Canada is favourable in regard to all that will enter into the keen competition of 1862. Shall these great expectations be realised? Shall Canada justify the anticipations excited six years ago? Or shall she seem to have retrograded—to have receded from the position formerly assumed, belying the plaudits of her friends, and ranking behind provinces then unrepresented? These are questions which cannot be overlooked in a discussion of the course recommended by the Boards of Arts, Manufactures, and Agriculture; and its wisdom depends upon the ability to evoke satisfactory replies. The money will be mis-spent which does not suffice to place the province on an eminence commensurate with its importance.

The following petition was transmitted to His Excellency the Governor General:—

“The petition of the Board of Agriculture for Upper Canada, the Board of Agriculture for Lower Canada, the Board of Arts and Manufactures for Upper Canada, and the Board of Arts and Manufactures for Lower Canada,

“RESPECTFULLY SHEWETH,—

“That during the last Session of the Provincial Parliament, your petitioners severally addressed your Excellency and the other branches of Parliament, praying that Commissioners might be appointed, with the necessary powers to secure the proper representation of the industrial resources of the province in the Great Exhibition to be held in London under the authority of a Royal Commission, in the year 1862, and that the necessary funds should be placed at the disposal of such Commissioners for that purpose.

“That this prayer of your petitioners was not then granted. Yet so heartily convinced are your petitioners, both of the desirability of securing such a representation of Canada on that occasion, and of the almost unanimous desire of the people of this province that the necessary steps should be taken to that end, that they venture again humbly to approach your Excellency and solicit executive action in that behalf.

“That as the result of the position taken by Canada in the Great Exhibition held in London in 1851, and in Paris in 1855, a knowledge of the vastness of the resources of this country has been spread throughout Europe, and large investments of capital have been made here tending to the rapid development of those resources. That this is evidenced alike by the high credit which the provincial securities have always since enjoyed, by the vast sums embarked in our railways, and by the multiplication of agencies for the loaning to Canadians of transatlantic capital for the improvement of real estate. It has also been evidenced by the establishment in this country of foreign consulates, and the development of its foreign trade as well as by the efforts made (in France more especially) through those consulates further to develop and extend our commercial relations with other countries. It is also evidenced by the success of recent postal conventions with foreign governments, which, previously to 1851, would not have conceived of Canada as a country with sufficient resources to establish and maintain separate transatlantic postal communications.

“That since the year 1855 new and important discoveries of mineral wealth have been made—the rich copper ores of Lower Canada and the mineral oils of Upper Canada being specially noteworthy—new and important branches of industry have arisen; and it is fitting that these should be brought under the attention of European capitalists and men of enterprise with due prominence.

“That a new census of the province has just been taken, and some of its more prominent results ought to be compiled and laid before the European public; and this can in no way be so effectively done as through the agency of a Commission, appointed to represent Canada in this third Great International Industrial Congress.

“That all important foreign countries, even the United States (not adequately represented on previous occasions, and now suffering the ordeal of war), have announced their intention of competing on this occasion, and have appointed Commissioners. All other British Colonies (including the Acadian Provinces, before unrepresented) almost without exception have done likewise; and therefore for Canada to absent herself were to make a confession that she has, as compared with her sister colonies, retrograded, or remained stationary, which must prove prejudicial to her interests. Intending emigrants cannot fail to be influenced in a greater or less degree by the position which the several colonies take in these Exhibitions, though not possibly to the extent originally anticipated, and nothing can be of greater importance to Canada than a healthy immigration to her untilled fields and her unworked mines.

“That by the 6th rule or order of the Royal Commission, no party desiring to send articles to the Exhibition can do so, or communicate with that Commission, except through Commissioners appointed as the organ of communication by the Government of his own country, and a barrier is thus placed in the way of individual efforts to exhibit Canadian products. Besides, such individual efforts must fail to produce the desired effect which more complete and united representation of the country's resources would do.

“That it is necessary that steps should be immediately taken to secure space in the Exhibition building, since the Royal Commissioners have advertised that the allotment will be made a few weeks hence.

“That if a Commission were forthwith appointed and space secured—it might, through the instrumentality of the Geological Survey and the Agricultural Societies, and by an appeal to individuals to exert themselves in this behalf, secure a large representation of the products of the soil and mines, almost for the mere cost of transport.

“That if Your Excellency were advised to lay before Parliament, should it be called together before or in the month of February next, a moderate estimate for the expenses of the Commission, preparations could be forthwith made by individual exhibitors, and articles made for submission for selection to the Commissioners in March, to be shipped during that month to Britain.

“That the cost to the province of its part in the Paris Exhibition of 1855 was, as your petitioners are informed, altogether 60,000 dollars.

“That many expenses were then incurred which might now be unnecessary, the voyage being shorter, and one transhipment being avoided. Your petitioners are convinced that out of a similar, or perhaps less grant, the half might be returned to the Provincial Treasury on this occasion, if due economy were exercised in its arrangement.

“Wherefore Your Petitioners humbly pray that Your Excellency will be pleased to appoint a Commission invested with the necessary powers to secure the representation of the industrial products and resources of this Province in the Exhibition to be held in London during the next year, and with such assurances with respect to the grant to be recommended to Parliament, as Your Excellency may be advised, it is possible to make.

“And Your Petitioners, as in duty bound, &c.”

To this petition the Secretary of the Board of Arts and Manufactures has received a reply from the Provincial Secretary, announcing “that his Excellency the Governor General has had under his consideration in Council the petition and memorial of the Board, praying that a Commission be appointed to arrange for a proper representation of the products of Canada at the Great Exhibition of the Industry of all Nations, to be held in London in 1862,” and informing him that, “in view of the facts, his Excellency in Council has deemed it expedient that Commissioners be appointed, through whom Canadians can procure admission of such articles as they may wish to transmit to the said Exhibition.

“His Excellency has accordingly been pleased to appoint

the gentlemen named below to be Commissioners for such purpose, viz.:—

“Sir W. E. Logan, F.R.S., Director of the Geological Survey, *Chairman*.

“The Hon. Louis V. Sicotte, M.P.P., President of the Board of Agriculture, L.C., St. Hyacinthe.

“Col. Edward W. Thompson, President of the Board of Agriculture for U.C., Toronto.

“John Beatty, Jun., Esq., M.D., President of the Board of Arts and Manufactures, U.C., Cobourg.

“Jean Charles Tache, Esq., M.D., Quebec.

“Brown Chamberlin, Esq., B.C.L., Secretary of the Board of Arts and Manufactures, L.C., Montreal.

“J. B. Hurlbutt, Esq., LL.D., Hamilton.”

Although no grant was obtained from the Colonial Parliament at its last session, to enable the Commissioners to procure the necessary articles to forward a complete collection to represent the natural and industrial resources of the country in the Exhibition, the Chairman has promised on his own responsibility to procure a proper collection of specimens of economic minerals; the Boards of Agriculture have undertaken to furnish a collection of cereals and other agricultural products; and the Local Commissioners have since received a promise of £1,200 from the Government to make the representation in other respects creditably complete. The Canadian products, it is anticipated, will occupy fully as large a space as in 1851 and 1855, or about 3,000 superficial feet. The collection of woods, cereals, and minerals is expected to be very complete.

The *Canadian News* thus speaks of the province, its progress, and the benefits to be derived from these industrial gatherings:—

“These gatherings of the industry of all nations have now become so many stand-points in the onward march of the world’s civilisation, from which each competitor in the lists may commence a fresh start, and to none are they likely to prove of greater or more lasting benefits by the spirit of emulation which they create than to the young countries on the western shores of the Atlantic. Prior to the great original of these International Exhibitions held in 1851, Canada and her sister provinces were comparatively speaking unknown; but the part they took in the Hyde Park Exhibition, in the display of their natural products and manufactures, removed in a great measure the ignorance which then obtained throughout Europe regarding their immense capabilities as producing and exporting countries.

“The subsequent Exhibition held at Paris in 1855, in which Canada occupied so prominent and important a position, also materially assisted in the further dissemination of information regarding the marvellous resources of a country which was formerly considered in France but as so many acres of snow; and doubtless to these displays the present flourishing position of the province may in some degree be attributed. That emigration received a considerable impetus through their instrumentality we are well aware, and as emigration is by far the most important element in the prosperity of so vast a country as Canada, one so rich in natural productions of the soil and forest, and yet so sparsely populated, we can well understand the earnest anxiety of its executive to have the province properly represented in the Exhibition of next year. It is an opportunity of which every advantage must be taken. Canada has not only to maintain the good name she secured for herself in 1851 and 1855, but she has also to prove that she, too, has kept pace with the extraordinary progress which has characterised the social events of the last decade in this hemisphere. And in this respect she will, from what we hear, fully justify all our expectations.

“Mr. Dufresnoy, member of the Institute of France and Inspector-General of Mines in that country, thus alluded to the collection of minerals at the Great Exhibition of 1851 made by the talented provincial geologist, Sir William Logan:—

“Of all the British colonies, Canada is that whose exhibition is the most interesting and the most complete, and one may even say that it is superior, so far as the mineral kingdom is concerned, to all countries that have forwarded their products to the Exhibition. This arises from the fact that the collection has been made in a systematic manner, and it results that the study of it furnished the means of appreciating at once the geological structure and mineral resources of Canada.”

“Since the above was written, Canada has not only given to the mining world the famous Acton copper quarry, but throughout its length and breadth its vast mineral resources have been most satisfactorily proved. At the Ramsay lead mines of Carleton Place, at the copper mines of Melbourne, at the gold veins at the Chaudière—and, lastly, at the newly discovered oil springs in the western peninsula, as well as in the far east district of Gaspé, ample evidences of unlimited wealth—although as yet undeveloped—exist, and require but the necessary outlay of capital to aid, in no ordinary degree, the future material prosperity of the province. In this respect alone, the advantages, therefore, of such an Exhibition as that intended to be held in the forthcoming summer cannot be over estimated. What Canada most stands in need of is working capital, and we look upon the Exhibition of 1862 as the best opportunity that could be given of advertising her wants in this respect.

“Nor is it in minerals alone that Canada possesses such unlimited sources of wealth. Her forests, extending over 360,000 square miles, unrivalled for their variety of species and size of timber, when of full growth, are of equal importance as sources of future greatness. The specimens of her woods exhibited recently at Liverpool and other places by Mr. Quin, the timber supervisor at Quebec, and comprising oak, maple, walnut, yoke elm, birch, ash, pine of several descriptions, hemlock, tamarac, spruce, yellow and black fir, cedar, and poplar, created great interest amongst the timber merchants of England and France, and the result of Mr. Quin’s mission was the inauguration of a trade in manufactured timber for English and French markets which had never before been exported from the St. Lawrence. And when to these products of the forest and to the mineral wealth to which we have referred we add the agricultural produce of the soil, Canadians may well point with pride to them as evidences of resources which cannot fail to raise their country high amongst the nations of the earth.

“The Exhibition of 1862 will again bring Canada prominently before the world, and much yet remains to be known of her illimitable powers. Her soil is boundless and fertile; her forests, we have shown, have no superior on the face of the globe, and are waiting only the application of capital. Her past progress is marvellous, and her future will be more so. She now presents a field for the employment of money for investment second to none of England’s colonies. The nominal rate of interest in all transactions is 6 per cent., but mortgages or ordinary investments in the banks and other public companies of the province rarely fail to bring a return of less than 8 per cent. per annum. The higher the rate the less certain the security, is an axiom in equal force there as elsewhere, but the minimum of interest being 6 per cent., a return within four per cent. above that figure, and which would appear as involving a great risk here, is there an every-day business transaction; and we shall be much disappointed if, as one of the results of next year’s gathering at Kensington, an influx of British wealth for investment in the province, by which many highly remunerative enterprises would be set on foot, does not take place commensurate with the field which is presented for its employment.

“Canada will not only exhibit her mineral and agricultural products, as well as the results of her labour in her forests, without fear of the competition to which she will be exposed, but in certain other manufactures she may also enter the lists with any of her older competitors, and not be ashamed of the comparison. In the arts and sciences,

the consequences of the more advanced civilisation of European nations, she will not attempt to compete, but even in these respects we learn that her appearance will be most creditable. In the manufactures to which we allude, we may mention agricultural implements, tools, cloths, tissues, &c., in the formation of which iron, copper, lead, the plastic earths, wood, hemp, flax, and straw constitute the principal materials, and all of which she has in the greatest abundance; and we may mention that, but for the present unhappy struggle in the neighbouring States, Canada would have entered into a spirited competition with Lancashire in the manufacture of cotton, as several mills on a large scale would have been ready for work had they had the raw material with which to commence their operations. Canada unquestionably held the first place in the Exhibitions of London and Paris for its display of natural wealth and its productive capacity; and if, as Prince Napoleon said at the latter Exposition, they attracted the attention and challenged the admiration of the world, we make no doubt that the efforts of the Commissioners whose appointment we recently announced, will secure a like verdict for the display to be made by the province in next year's International Exhibition."

NOVA SCOTIA.

In June, His Excellency Lord Mulgrave, the Lieut.-Governor, by the advice of the Executive Council, was pleased to nominate and appoint the following gentlemen to be Commissioners for the province of Nova Scotia, for the International Exhibition of London:—The Honourable Joseph Howe, chairman; The Honourable A. G. Archibald, Attorney-General; The Honourable Benjamin Weir, M.P.P.; Charles Tupper, Esq., M.D., M.P.P.; John Esson, Esq., M.P.P.; John Tobin, Esq., M.P.P.; His Worship the Mayor of Halifax; Philip C. Hill, Esq.; John A. Bell, Esq.; William Cunard, Esq.; Robert Morrow, Esq.; Andrew M. Uniacke, Esq.; James Thompson, Esq.; Andrew McKinlay, Esq.; Robert G. Haliburton, Esq., Secretary to the Commission.

The Legislature have undertaken to provide the necessary expenses, Messrs. Baring, Brothers, being the Financial Agents.

A. M. Uniacke, Esq., has arrived in London as Commissioner for the province. This colony demanded a space of 120 feet by 60 feet; but they will have to moderate their requirements very considerably.

The collection from this province will comprise furniture, woods, iron, gold, and other minerals, building stores and agricultural produce, cured fish, &c. One of the objects to be sent is a section of the Pictou coal seam, about 30 feet high and 140 feet base.

PRINCE EDWARD'S ISLAND.

In September, the Lieut.-Governor appointed a Commission, consisting of the following twelve gentlemen:—The Honourables John W. Gray, Thos. H. Haviland, Alex. Laird, Daniel Brennan, Joseph Hensley, Jas. C. Pope; and Daniel Kaye, G. W. De Blois, James Robertson, George Beer, John Lawson, and Henry Longworth, Esqrs.; Mr. Henry Haszard, being appointed Secretary to the Commission.

The interest felt in the Island on the subject of the International Exhibition is very general, and the contributions of those desirous of exhibiting will be larger and more varied than was at first supposed. Indeed, the colony would like to have had a space of about 1,000 square feet, an area which it is utterly impossible to grant. The colonists intend to exhibit flax and hemp, wool and home-spuns, carpeting and rugs, skins and furs, leather and saddlery, and household furniture representing the island woods in their manufactured beauty, preserved wild fruits, maple sugar, maple and fruit vinegars, and all sorts of fish in tins with glass tops.

NEWFOUNDLAND, which has hitherto held aloof, has, at the last moment, determined to take part in the competitive display, so that there will not be a single British North American colony unrepresented. A Commission,

composed of three members of the Legislative Council and three of the House of Assembly, has been appointed by the Governor, and the colonial products will occupy a space of about 100 feet. F. A. Gisborne, Esq., has been appointed the Commissioner in London, to co-operate with and carry out the views of the Commission.

NEW BRUNSWICK.—Having already* furnished the preliminary announcements and details with respect to this province, I am now able to report what has actually been done.

On the 3rd Sept., a public meeting was held in the Mechanics' Institute, St. John, for the purpose of considering matters in reference to the Provincial Exhibition in October, and the representation of the province at the London Exhibition in 1862. The attendance was large.

His Excellency the Lieut. Governor occupied the chair, and opened the meeting with a few preliminary remarks, stating the object; the benefits and advantages that would result from a proper representation of the products of the soil and the genius of the skilled artizan both at the Provincial Exhibition at Sussex in October and the World's Exhibition in London in 1862; and the necessity of a combined effort in order to accomplish success. A series of resolutions were then passed as follows:

Resolved,—As the opinion of this meeting, that every exertion should be made to ensure a full and creditable representation of the resources and productions of the Province, at the International Exhibition to be held in London in May 1862.

Resolved,—That this meeting fully appreciates the importance of having the various industrial interests of the Province duly represented at the Provincial Exhibition in Sussex Vale, as affording the best opportunity of making selections for the London Exhibition.

Resolved,—That the aid given by the Legislature and the Government to secure a proper representation of the resources and productions of our country, at the London Exhibition, and for the encouragement of the Provincial Exhibition, must prove inoperative and result in failure, unless the people take an active interest in these desirable objects, and lend their individual aid and co-operation.

Resolved,—That to render the Exhibition a successful one and a credit to the Province, it requires the zealous assistance and contributions of the artists and manufacturers of the City and County of St. John.

In introducing the first resolution, his Honour Judge RITCHIE spoke of the importance and usefulness of Exhibitions such as those which were shortly to take place. The importance of these Exhibitions was acknowledged both in Europe and America, and the benefits resulting therefrom were considered to be great. He then alluded to the manner in which Nova Scotia and New Brunswick were represented in the London Exhibition in 1851, and in the Paris Exhibition at a subsequent period, and compared it with the creditable display which the sister province, Canada, had made on those occasions. He was informed that at the recent exhibition meeting at Halifax, Mr. Howe had stated that in the Paris Exhibition large compartments were set apart for Nova Scotia and New Brunswick with the names of the two provinces in large letters above them, and beneath *nothing at all*; that on beholding this, he (Mr. Howe) had shrunk away from the building in dismay and disgust. His Honour then went on to say that he, too, had visited the Paris Exhibition, but he was not so fortunate as his friend Mr. Howe of Nova Scotia; he not only had not seen any articles to represent either of the two provinces, but even their very names were not observed by him. Whether some friendly hand had in pity removed them he could not say. It were better, on an occasion like that, that Nova Scotia or New Brunswick should be unnamed, than, being unrepresented, they should be shamed. He hoped that a similar fate would not be in store for New Brunswick in 1862. It was absolutely necessary, in order to have a creditable representation both at the Provincial and World's Exhibitions, that the utmost exertion should be made by all classes. The Legis-

lature had granted a sum of money to aid in the movement, and he would have been glad had the circumstances of the country warranted an appropriation of five times the amount allotted. Much might be said, and columns written with a view of inducing persons to settle in the Province, but he did not believe that all these efforts would accomplish a tithe of the good which will accrue from these Exhibitions. His Honour then concluded by alluding to the difficulties in the United States, and the advantages, which were thus offered for successfully carrying on manufacturing operations, and the incentive which this state of things should be to their manufacturers in endeavouring to secure a creditable display of their productions at the World's Exhibition.

Mr. W. M. WRIGHT, the mover of the second resolution, said:—The benefits resulting from the holding of Exhibitions such as those which were shortly to take place, were no longer a question, but had assumed the proportions of an admitted fact. The opportunities thus afforded to the industrial classes to advertise their business by displaying the various results of their skill and genius could not be too highly prized. Hitherto New Brunswick was too much known abroad as part and parcel of Canada; Nova Scotia was considered merely as an important military and naval station; Prince Edward's Island was only recognised on account of the illustrious name it bears; while Newfoundland was regarded as a mere fishing station. It should be the object of New Brunswickers, as far as they were concerned, to remove these injurious impressions, by making a creditable display of the various mechanical, artistic, mineralogical, and agricultural productions at the Exhibition in Sussex, from which a judicious selection would be made for the London Exhibition.

Mr. CHAS. N. SKINNER, in seconding the resolution, said that if the only manner in which New Brunswick had been represented in London in 1851 was by the figure of an Indian in a bark canoe, a numerous and judicious representation of her various products would show to great advantage in 1862, and give a very favourable idea of the progress made in eleven years. He then dwelt in glowing terms upon the great resources of the province—mineral, agricultural and otherwise; flatteringly alluded to the skill, industry, and assiduity of the mechanics and artists; referred to the unexampled success attained by her ship-builders in constructing vessels which, for swiftness and other excellent qualities, cannot be surpassed by those of any other country in the world. He hoped that the most strenuous efforts would be made by the people of the province to secure a creditable representation in London in 1862, in order to show the people abroad that New Brunswick was a distinct and separate portion of Her Majesty's dominions in North America, possessing within itself all the elements of greatness, which required only industry, energy, and perseverance, to secure a full development, and establish the name and fame of the country, rendering it one of the brightest jewels in the Crown of Great Britain.

The Hon. S. L. TILLEY, in moving the third resolution, set forth the advantages that would accrue from a respectable representation at both exhibitions; felt gratified that His Excellency, before departing from the shores of New Brunswick, would have an opportunity of witnessing the exhibition at Sussex, and of forming an opinion of the resources of the province over which he had presided for a number of years, and the various localities of which he had frequently visited; and referred to the efforts made by the Legislature and the Government in providing means and giving encouragement to the forthcoming exhibitions, affirming the correctness of the statement made in the resolution, that unless the people generally take an active interest in these desirable objects and lend their individual aid and co-operation, the efforts of either the Legislature or the Government would prove of non-effect. He referred to the efforts which Nova Scotia was making, and thought that these efforts on the part of their neighbour should and

would excite a laudable spirit of emulation in the minds of the people of this province. The exhibition at Fredericton, some years since, was a credit to the province, and could the articles that were even exhibited at that time be transported to London in 1862, the representation of the province would be no mean affair. But since that time progress had been made, and it was necessary that increased exertions should be put forth to surpass all former efforts. He observed, in order to show the progress that had been made in the province within a few years, that at the time the last census was taken, the whole value of the manufactures of the province for one year amounted to but £130,000; now, however, in the same length of time, one house alone had manufactured between £40,000 and £50,000 worth.

Mr. J. W. LAWRENCE, in moving the fourth resolution, spoke of the disadvantage which the people of the Province laboured under in depending too much upon the lumbering business, not that this business had not been, and would not become, a source of benefit, but that too much attention had been paid to it to the disregard of other pursuits less hazardous in their operations, and eventually more surely profitable. If the people of the Province were less dependent on this business, and would turn their attention to agricultural and mechanical pursuits, the fluctuations in business consequent upon the depression of the lumber trade would be neither so frequent nor yet so disastrous in their consequences. The people of Nova Scotia were more wise in this respect than those of New Brunswick; they engaged in those branches of trade which brought in more certain and satisfactory returns. The Government was entitled to credit for the efforts made to render the Exhibition at Sussex creditable, and secure a proper representation in London, and these efforts should be duly appreciated by those for whose benefit they were intended. He referred to the prize of 400 dollars which the authorities of Nova Scotia offered for the best essay on that Province, and then dilated upon the benefits which would accrue therefrom. He also alluded to the publication, by authority of the Government of New Brunswick, of the essays for which prizes had been offered and given by the directors of the Mechanics' Institute of St. John, on "New Brunswick as a Home for Emigrants, and the best means of promoting Immigration," and the beneficial effects which the circulation of these publications will produce. He concluded by pronouncing the press, the best medium through which to make the country and its resources more widely known and more generally appreciated.

On the 1st of October, the local show or fair, preliminary to the selection to be made for the London Exhibition, was opened at Sussex Vale and continued for the five following days.

The Hon. Mr. Manners, the Lieut.-Governor of the Province, opened the Exhibition. The following address was presented to him:—

"May it please your Excellency:

"The Provincial Board of Agriculture having decided that an Exhibition should be held this year at Sussex Vale, and having delegated to us, as its Executive Committee, the authority to superintend and manage it, we beg to announce that it is now ready for the inspection of the public; and we respectfully request that Your Excellency will be pleased to open the same.

"The Act creating the Provincial Board of Agriculture having been passed with your Excellency's sanction, we hope that its proceedings thus far have met with your Excellency's approval; and that this Exhibition will be attended by such results as will justify the encouragement given by the Legislature, and satisfy the expectations of the country.

"As that admits the holding of Exhibitions every three years, we have made arrangements for a large attendance of exhibitors and spectators, and have felt ourselves justified in incurring considerable expense in

endeavouring to make the building and grounds as commodious and attractive as time would permit.

"As your Excellency has always taken a deep interest in the operations of the Board, it affords us, its representatives, great satisfaction to have the advantage of your presence at the inauguration of the first Provincial Exhibition held under its auspices, and that you should have had so favourable an opportunity before leaving the province, of examining its various resources and productions; and we trust that the evidences and the progress made by the Colony under your Excellency's administration may not be the least pleasing feature of your sojourn amongst a loyal and industrious people.

"On behalf of the Board of Agriculture, we take advantage of this, in all probability the last occasion that may offer, to thank your Excellency for the valuable advice and assistance which, individually and as a Board, we have invariably received from you in the performance of our duties.

"(Signed) "A. E. BOTSFORD,
"Chairman, &c."

His Excellency then read the following reply:—

"Mr. Chairman and Gentlemen, Members of the Executive Committee of the Provincial Agricultural Board,—You have been called by the Legislature and the Provincial Board of Agriculture, of which you are on this occasion the representatives, to collect and to prepare, for the purpose of exhibiting to the people of New Brunswick, and to all who may come hither to examine them, samples and specimens of all articles, the growth, produce, or manufacture of the province. These are onerous and important duties, and I can assure you that I have had the greatest satisfaction in giving to you every assistance in my power.

"It is my firm belief that it is of the greatest importance to New Brunswick that she should be in a position next year to assume and maintain at the General Exhibition in London the position to which her industrial progress and natural resources entitle her. And if this Provincial Exhibition be regarded as the preparatory step to entering into competition with the world next year, not only the competitors, but every inhabitant of New Brunswick, whether he be rich or poor, and in whatever part of the Province he may reside, will, I think, recognise the fact that he has a personal interest in its success.

"I hope that this Exhibition may be the successful predecessor of other Exhibitions increasingly successful; and I can assure you, with heartfelt sincerity, that although absent, I shall always continue to feel the deepest and warmest interest in the prosperity and progress of the agriculture, commerce, and manufactures of New Brunswick."

His Excellency then proceeded, in company with Jas. G. Stevens, Esq., Secretary of the Agricultural Board, to view the various agricultural and mechanical products, while Mrs. Manners Sutton and family, in company with the Hon. A. E. Botsford, ascended to the gallery, to view the fine arts, needle-work, &c.

The following account of some of the principal articles shown, is condensed from the local paper, the *New Brunswick Courier*, of St. John:—

"*Agricultural*.—From various sections of the province were exhibited numerous samples of really excellent wheat; various kinds of oats, which it would be difficult to surpass in the best grain-growing countries; barley, rye, peas and beans, which could not fail to command the attention and excite the admiration of the beholder; grass seed of good quality; wheat and rye flour which would compare favourably with the fancy brands of other countries; oat, corn and buckwheat meal of excellent quality; squashes, pumpkins and cucumbers of formidable proportions; turnips, carrots, beets, parsnips, and mangold wurtzel, of extraordinary size; cabbages, some of them as curious in appearance as others are remarkable in size; tomatoes, such as we have rarely seen surpassed; and fruit, such as apples, pears, &c., which looked very good.

The dairy too was fairly represented in the shape of butter, both roll and firkin, no doubt as good in quality as it was in appearance; and cheese equally commendable.

"*Mechanical*.—The display of the skill, industry, and genius of the mechanics of New Brunswick, was truly more than creditable, and a convincing proof that they are able to compete with the mechanics of other more populous and wealthy countries.

"There was a good display of saws, edge tools, and steel springs, for railway and road carriages.

"The display of carriages and sleighs was very effective.

"Messrs. Flemming and Humbert's foundry and machine shop is well represented by two steam engines, one an oscillator and the other a stationary engine. They are neatly finished, have a boiler attached, and when set in motion, as they occasionally are, work admirably. There were also fire engines, brass castings, and a model steering apparatus.

"The tack factory of Mr. Foster, of St. John, displayed a neatly arranged assortment of tacks, brads, &c.

"There were samples of Albertine oil, and a specimen of Albert coal in its crude state; models of the St. John suspension bridge, Hammond river, and other railway bridges.

"Of native woods there was an abundant supply, some specimens polished, others in the rough state. The collection furnished by Mr. D. R. Munro, clerk in Lloyd's office in St. John, was the most numerous, numbering upwards of fifty specimens, beautifully polished, besides being accompanied with the foliage, and in some cases the fruit of specimens represented. Mr. Munro had likewise on exhibition the model of a patent self-connection for locomotives.

"The pianos from the factory of Mr. John R. Coleman, of St. John, attracted considerable attention.

"There were, besides the articles enumerated, a great quantity of agricultural implements, such as rakes, hoes, forks, &c. Stoves in great variety; spinning wheels, capstans, earthenware from the manufactory of Wm. Warwick, of St. John; minerals of the province in profusion, and a great collection of other things which our space will not allow us to particularize. We cannot, however, leave the ground floor, with its profuse display of the useful, without making particular mention of a collection of "Specimens of Dried Plants," secured by the Rev. James Fowler, of Kouchibouguac, Kent Co. The collection embraces a specimen of the foliage of almost every conceivable plant known to grow or exist in this province. Upon the sheets of cardboard to which these specimens are attached, is written the technical term of each plant, and the meaning in English, and the portion of the floral kingdom to which it belongs. This case is invaluable, and cannot have been secured without the expenditure of much time, toil, and study. A monument, manufactured from Memramcook freestone, by F. W. Clear, of St. John, occupies a prominent position.

"Rankine's steam biscuit bakery, St. John, was represented by a case of various descriptions of biscuits.

"The display of trunks, valises, &c., from the factory of Alex. Sime, of St. John, was not undeserving of attention. The specimens of antique book-binding from the establishment of Messrs. J. and A. McMillan, of St. John, were much admired.

"There were some very good samples of printing and book paper, hardware, Manila, dry goods and grocers' wrapping papers; sheathing, carpet and tailors' pattern papers. Samples of the material, in various stages approaching to completion, from which the various kinds of paper are made, were also exhibited.

"There was an assortment of confectionary from Mr. Brandt, of St. John; preserved salmon from Messrs. J. and A. D. Sheriff and Mr. W. H. Fraser, of Northumberland; spiced salmon by Mr. William Blizzard, of St. John; preserved lobsters from Mr. Thomas Fleigher, of Northumberland; syrups in profusion from Mr. Fountain, of Miramichi; and rhubarb and currant wines, and grape, sugar, spirit, from the St. Andrew's Distillery.

The Executive Committee of the Board of Agriculture have since been actively at work in selecting the articles considered deserving to be forwarded to London, and we hear of the following having been chosen among numerous others. Messrs. Flemming and Humbert are constructing an oscillating engine for transmission. The following will form part of the London Exhibition:—

“Two Newell posts and six balustrades, of different native woods, from the establishment of Messrs. Fairbanks and Co. A fine assortment of hatters' and furriers' work, from Mr. A. Magee, including the beaver overcoat and sleigh robe (bear and lynx) which were greatly admired at Sussex. A set of harness, from Mr. William J. Brown, King-street. An assortment of biscuits from Rankine's bakery, Dock-street. Homespun from the Mispick factory, and from Messrs. Titus and Snow's mills in the Titus settlement, King's county. Various kinds of paper manufactured by Messrs. Philips Bros. Stained glass from Mr. G. F. Thompson, Dock-street. Brass castings and plumbers work from Mr. Charles Pearce and Messrs. V. Hayward and Co. Iron in all its stages, from the Iron Works of W. H. Scovil, Esq. An assortment of axes and other edge tools from Messrs. Broad, Messrs. Spiller, and another establishment. Horse shoes, to be neatly prepared, from Mr. Scrymgeour. A superior iron plough and grubber, from Messrs. D. and J. Willet. Carriage and railway springs from W. H. Adams, Esq. Painted blinds and a grained door (New Brunswick pine in imitation of oak), from Mr. J. C. Miles, Canterbury-street. An improved steering apparatus from Mr. D. L. Allen. Oils and the materials from which they are manufactured, from the New Brunswick Oil Works Company. Models of a saw mill, and the locomotive which drew the Prince of Wales over the railway, from Mr. John Hunter, in the railway workshop. A collection of native woods of all kinds. Native woods, with twigs and leaves attached, from Mr. D. R. Munro, of Lloyd's office. A collection of dried plants, grasses, &c., from the Rev. James Fowler, Kouchibouquac. A splendid mirror from Mr. Potter's establishment. A buck-saw frame, with an ingenious arrangement for tightening the saw, from Mr. Oliver Barbarie, Albert Colony.

“Handsome barrels for containing the grains which will be sent to London are now being manufactured at the Penitentiary.”

ON THE ESSENTIAL OIL OF PIMENTO FROM THE BERRY AND LEAVES.

By DR. L. Q. BOWERBANK.

The following communication was lately addressed to the Secretary of the Royal Society of Arts, Jamaica:—

I forward a phial of essential oil extracted from the berry of the pimento. The process of extraction was thus:—A handful of the spice as it is prepared for market was placed in a glass retort with half-a-pint of water, the neck of the retort luted to the receiver, and the flame of a spirit-lamp applied to the retort. The vapour arising, on being condensed, assumed the form of a milky liquid, which, on being suffered to remain quiet, separated into globules of oil, which sank to the bottom of the vessel, leaving the water transparent; that being decanted, left oil.

“Bryan Edwards, in his “History of the West Indies,” thus notices the oil of pimento:—“It is remarkable that the leaves are equally fragrant with the fruit, and, I am informed, yield on distillation a delicate odoriferous oil, which is commonly used in the medical dispensaries of Europe for oil of cloves.”

There is nothing new in the fact of the pimento producing an essential oil; but at this period the attention of the public, which is now excited by the considerations of the minor productions of Jamaica, may be beneficially directed to this branch of profitable industry. A large quantity of leaves are annually wasted while the crops of pimento are being gathered. Were it generally known

and appreciated that a valuable product might be cheaply and easily extracted from such portions of the tree as are now suffered to remain useless, much good might result. It would open to the industrious man in humble circumstances a daily source of profit; for a very small still of a few gallons, daily set in motion by his kitchen fire, would yield a considerable return at the year's end. And where, in this Isle of Springs, can water and the leaves of pimento not be procured—where

—“Sabeau odours from the spicy shore

Of Araby the blest”

abound?

Further information from the Society on this subject, regarding the remarkable value and demand of this oil, as well as the cheapest process for extracting it in considerable quantities, cannot fail of being useful to the public.

In reference to the above communication, we would make the following remarks:—

Pimento-berries bruised and distilled with water yield the pimento-oil of commerce. This oil is official in the Pharmacopœias of the London, Edinburgh, and Dublin Colleges.

Dr. Royle states that, “it is obtained in the proportion of 1 to 4 per cent. by distilling bruised pimento with water. It resembles, and is sometimes sold for oil of cloves, or employed to adulterate it.”

Dr. Pereira, in his work on *Materia Medica*, observes—“Mr. Whipple informs me that from 8 cwt. of pimento he procured 41 lb. 6 oz. of oil (heavy and light): this is nearly 6 per cent. He also informs me that the light oil comes over first. The oil of pimento of the shops is a mixture of these two oils. By distillation with caustic potash, the light oil is separated; the residue, mixed with sulphuric acid and submitted to distillation, gives out the heavy oil.

“*Light Oil of Pimento* (Pimento Hydro-carbon) has not to my knowledge been previously examined. Its properties appear to be similar to those of the light oil of cloves. It floats on water and on liquor potassæ, and is slightly reddened by nitric acid. Potassium sinks in, and is scarcely if at all acted on by it.

“*Heavy Oil of Pimento* (Pimentic Acid), very similar to caryophyllie acid or the heavy oil of cloves. It forms with the alkalies crystalline compounds (alkaline pimentates), which become blue or greenish on the addition of the tincture of chloride of iron, owing to the formation of a ferruginous pimentate. Nitric acid acts violently on, and reddens it.”

The medical uses of the oil of pimento are very limited. It is sometimes employed to relieve toothache, to correct the operation of other medicines, as purgatives and tonics, and to prepare the official essence, spirit, and distilled water of the Pharmacopœias. The Edinburgh College directs the spirit of pimento to be prepared by distilling the bruised berries with spirit; and the same College, together with the London, obtain their distilled pimento-water by distilling the berries with water.

The following is an analysis of the husks and kernels of pimento, as obtained by M. Bonastre:—

	Husks.		Kernels.
Volatile oil	10.0	...	5.0
Green oil.....	8.4	...	2.5
Solid fat oil.....	0.9	...	1.2
Astringent extract	11.4	...	39.8
Gummy extract	3.0	...	7.2
Colouring matter	4.8	...	—
Resinous matter	1.2	...	—
Uncrystallised sugar	3.0	...	8.0
Malic or gallic acid	0.6	...	1.6
Lignin	50.0	...	—
Saline ashes.....	2.8	...	1.9
Loss	1.6	...	1.8
Red matter insoluble in water	—	...	8.8
Pellicular residue	—	...	10.0
Brown floccule	—	...	3.2
	100.0		100.0

We were not aware that the oil had hitherto been prepared from the leaf of the pimento, but have little doubt that this can easily be effected; in fact, we find, on reference to Dr. Pereira's work, that an analogous oil is obtained in Ceylon from the cinnamon leaf—"oil of cinnamon leaf." It is exported from Ceylon, and is sometimes called, on account of its colour, clove oil. "I am informed by a gentleman," adds Dr. Pereira, "on whose estate in Ceylon it is obtained, that it is procured by macerating the leaves in sea-water, and afterwards submitting both to distillation. It is a yellow liquid, heavier than water, and has an odour and taste analogous to those of oil of cloves."

We fear the consumption of pimento oil is too limited to render it an object of manufacture on a large scale; but, as our correspondent justly observes, instead of wasting, as at present, the leaves and young shoots broken off in gathering the berry, it would be well that they should be turned to some good account. We know of no finer liqueur or dram than that prepared from the pimento berry, and we have been informed that a dram no way inferior can be obtained by substituting the leaves for the berry. We would suggest that a trial should be made.

While on the subject of pimento, it may be observed that the true bark of this tree at certain periods of the year appears to contain a very large quantity of tannin; and we find that it is a common practice to bury pimento sticks in the red iron-clay, by which means, through the tannin contained in them combining with the iron of the soil, they become stained of a deep black colour. When cutting down trees for the purpose of thinning or opening out a pimento walk, it would be worth while to collect the bark, in order that its astringent or tanning properties may be tested.

For purposes of cookery, we have often observed twigs of dried pimento leaves suspended in kitchens; these leaves retain their aroma for a long time. Would it not be worth while to make them an article of export as a substitute for the berry, more especially when the usual crop is short or fails?

Home Correspondence.

RAILWAY MANAGEMENT FROM A TRAVELLER'S POINT OF VIEW.

SIR,—Mr. Baker and those who discussed his paper on railways, put some truths in a prominent light. It is a truth that daily railway travelling produces a mischievous effect on the health of a great number of persons, though there are many of strong health and vigorous elastic muscles, and with nerves like cartropes, who may set it at defiance. He whose occupation is out of doors, and more physical than mental, suffers less than those who sit down after their journey to mental operations. Nervous irritability and indigestion are caused by the railway carriage more than by the omnibus, from the fact of the vibrations being more minute, regular, and continuous, and for this reason a first class railway carriage may be worse than a second or third, which, by jumping, puts the passenger's body more into a condition of exercise by irregular movement. A passenger seated in a first class railway carriage, compresses a certain number of the circular tubes, through which his blood runs, to a tape-like form, and the circulation is checked till the feet get cold and the limbs benumbed, and the vibrations counteract the peristaltic motion of the bowels. This is why, in a long journey, the appetite is lessened, and moreover the air in the closed carriage is more or less vitiated, owing to imperfect ventilation. The second and third class carriages, the motion of which is less regular, affect neither the circulation nor the digestion to the same extent, and the omnibus is still less mischievous.

The old-fashioned carriages on the highway, with two sets of springs, diminished the vibration to a greater ex-

tent than our best railway carriages with one set, and there was a greater amount of oscillation and irregularity of movement. Every one knows that the regular vibration of a trembling ocean steamer is far more mischievous to digestion than a sailing vessel. The pleasantest and most healthy railway carriage, when not too crowded, on a fine day, is one of the long open third-class, roofed over, but without seats or partitions. In this case, the body of the passenger sways about on his own natural springs, and both circulation and digestion can go on as in walking exercise.

There is no doubt that, as at present constructed, the heaviest carriages are the easiest, that is to say, the *inertia* of the body and frame brings the springs to the pressure requisite for ease of movement without any load of passengers, and the small number of passengers scarcely affect the springs at all, so that they are easy for one or for eighteen. But carrying one ton of passengers upon five tons of vehicle is not a very profitable thing for railway companies, and naturally they do not encourage it. Mr. Baker is quite right in attributing the greater part of the difficulty to defective mechanical construction. The evil vibration commences with the contact and non-contact of the half-sledges called wheels and the rails, and it travels upwards through half-dummiéd springs to every portion of the framework. Spring cushions in first-class carriages slightly lessen the sensation while sitting, but not to the feet of the sitter.

It is not difficult to show categorically the many points that are mechanically wrong, nor to set forth the mechanical remedies. It would not be difficult to construct a light and effective train, free from oscillation, and nearly free from vibration, and equally easy to the sensations whether loaded or unloaded, but the first thing would be to catch a railway authority with power and will to carry the principle into effect, and the next thing would be to satisfy railway directors that their existing stock would not be damaged by a superior class. And it would be important also to work with such a train on a line without connection with other lines. This will come to pass when lines shall be constructed wholly for the transit of passengers and not of goods, one of the essential conditions of safety with respect to transit. One-fourth of the present dead-weight of trains will suffice when the chances of "pitching in," arising chiefly from fast and slow trains on the same line, in rapid succession, are removed. Whatever may be said of the advantages of a heavy engine in increasing power, it is quite clear that dead weight in a train must be a disadvantage. Axle-friction is 4lbs. per ton; wheel-friction at low speed runs to seven and eight, and at high speeds to 20 and 25lbs.

In railway improvement, as in other things, we must begin at the beginning, and it would be well if Mr. Baker and his friends would settle the first question, "What is a wheel?"

I am, &c.,

W. BRIDGES ADAMS.

SIR,—I beg to offer a few remarks on the able paper read by Mr. T. Baker. Every railway passenger knows full well that the "violent oscillation and increasing jar of the railway carriage" detracts greatly from the pleasure of travelling, and is doubtless the cause of much physical derangement, and of numerous accidents.

I am surprised that the discussion on the paper did not bring out the real cause of the discomfort, and that no one suggested an adequate remedy.

I have made the subject a matter of study for years, and am convinced that the cause of the evils is not so much in the construction of the carriages, or in the permanent way, but is to be attributed to the unbalanced momentum of the piston, piston-rods, connecting-rods, and cranks.

As the locomotive is now constructed, the cranks are at an angle of 90° to each other, so that when one cylinder is giving out its maximum force the other is at its minimum, or dead centres, and *vice versa*.

They are, of necessity, fifteen inches or more from the longitudinal central line, and, as the momentum of each piston is always diametrically opposed to that of the other, the locomotive is forced obliquely across the line, thus forming a zigzag every revolution of the driving wheel, that motion being communicated, through the buffer-springs, to every carriage in the train, but more particularly to the last carriage.

The action of the cranks is identical with that of two men pulling in a boat, alternately instead of in unison, and the results are the same.

Let any one observe the approach of a train at forty or fifty miles an hour, they will find that the engine never runs in a right line, despite of the load which is pulling at it, but in a zigzag course, which is reciprocated by the carriages, and the higher the velocity the greater the oscillation; this defect in the locomotive is the cause of great destruction and the derangement of the permanent way, and of the engine and rolling stock, and is, beyond doubt, the fruitful source of accident.

I am now taking out a patent for "Improvements in Locomotives," the objects of which are to so combine the mechanical parts that all the momentum of the various portions shall be on the longitudinal central line of the engine; it can therefore have no power, at any velocity, to deviate from a right line.

I am confident that railway travelling may yet become very much safer, far more agreeable and conducive to health, and at a greatly reduced cost to railway companies.

I am, &c.,

JOSEPH FAULDING.

338 and 340, Euston-road, N.W.

STEERING OF STEAMERS.

Sir,—The imminent risk to which the *Great Eastern* and many another noble vessel have been exposed from loss of her rudder, proves that, though the rudder may be, and I believe is, the best ordinary means for steering, it is not safe to depend upon one instrument alone, which, if injured or destroyed, leaves the vessel, for a time, at least, helpless, while there are frequent occasions when more rapid change of direction than the rudder alone will give is most desirable. This is especially the case for vessels of war which may have to fight when they have little or no headway, when the rudder does not act at all, or very little. Such a vessel must be able to turn short and quick if it is to act effectively as a ram. If it be correct that the *Warrior* requires a circle of three miles to turn round, her chance of running stem on an enemy trying to avoid her seems but small.

For these reasons I shall be glad to learn that Mr. Harrison's suggested experiments on different modes of steering were in progress, for it is very probable that smaller changes than putting in two instead of one screw would be sufficient; such a change would involve the rebuilding of a large part of the ship.

It seems to me essential, for ships of war at least, that there should be means for quickly turning round the vessel, whether otherwise at rest or not, and that the apparatus should be below water, out of the reach of shot. A small screw near the head, and set amidship, so as, when revolving in one direction, to drive her head starboard, and the contrary when reversed, might be put into a ship without very much reconstruction; but a screw so situated would offer some obstruction, and would probably catch weeds, &c., and, perhaps, be stopped at a critical moment. These objections could not be urged against another plan, that of making the engine work pumps, drawing water, through openings guarded by gratings, at the bows, and discharging it backwards at the beam at each side. When both pumps act equally, the effect of this employment of a small part of the steam power would be simply to drive the vessel forwards with a force equal to that with which the water was driven backwards, but by working them unequally, the course of the

vessel would be changed, or if the direction of the current of one of the pumps were reversed, the vessel might be turned round without any other change of place. The same powerful and rapid steering power might be thus obtained as would be given by two screws or paddle wheels working independently, but the pumps might be put into a ship with far less change of her structure than would be necessary for substituting two screws for one, though that might be the best plan in building a new ship, not, however, in substitution of, but in addition to the rudder, which is the best steering instrument for common use. It is safest to have two, or even three modes of steering, lest one should be insufficient or should fail.

I am, &c.,

P. H. H.

Proceedings of Institutions.

ALTON MECHANICS' INSTITUTION.—The twenty-fourth annual report of this Institution, for the year ending September 30th, 1861, speaks favourably of the position of the Institution, which continues to merit the liberal support accorded to it. There have not been many books added to the library in the course of the year, but their arrangement has been improved so as to make more room. Twenty-three volumes have been purchased, twenty-one of which were to replace the old copies which have been worn out in the service—thus making a total number of 1,510. The issues during the year have been more numerous than usual, amounting to 3,315, or an average of nearly 64 per week. The winter session opened with a concert, given both in the morning and the evening, but the former met with so little encouragement that it was only after a long discussion that the Committee determined to pursue the same plan in the ensuing autumn. The Committee were disappointed of several lectures. Thirteen were given, and were as usual well attended. Two on "The Chemistry of the Breakfast Table," by Mr. Mason, of Winchester; "An Hour with an Odd Character," by Mr. Lidgate, of Guildford; on "The Public Games of Ancient Greece and Rome," by the Rev. H. A. Plow, B.D.; on "A Month at Naples during the late Campaign," by Henry Cunningham, Esq.; on "Jerusalem," by A. C. Crowley, Esq.; on "The Age of Dragons in Great Britain," by B. Waterhouse Hawkins, Esq.; on "Marsupial Animals," and on "The Geographical Distribution of Animals," by J. W. Curtis, M.D.; on "Whitfield and his Times," by the Rev. W. Brodie, of Alresford; on "The Luminous and Calorific Phenomena of Voltaic Electricity," by Mr. E. Wheeler, C.E.; and two on "Water," illustrated by Experiments and Working Models, by Mr. F. Crowley, Mr. Waterhouse Hawkins was to give a lecture on the "Gorilla and other Monkeys compared and contrasted with Man;" Mr. Simpson, one on "Travelling in our Forefathers' Style and our Own;" Rev. W. A. Bartlett, one entitled, "Incidents in Ancient and Modern Travel;" Rev. T. G. Clarke, one on "Entomology;" and R. Fitz-Gerald, one on "Colour." Other lectures and readings are expected. As announced in last report, a *soirée* was held in November, 1860. It excited the usual amount of interest, and was attended by 204 individuals—as many as the Town Hall could conveniently accommodate. In the sixth annual Museum Report, the Curator states there have been several valuable additions made to the collections by various donors. The secretary of the Music Class reports that Mr. Powell continues to attend weekly to give instructions in various branches of instrumental music, and that the average number of members during the year has been eleven. Some younger members are now expected to join, but if the number does not decidedly increase it is probable the class will be discontinued at the termination of another year. The number of subscribers amounts to 259, viz., annual subscribers of 10s., 60; annual subscribers of one guinea, 46; quarterly subscribers, 134;

quarterly subscribers who have paid part of the year and left, 19.

LONDON MECHANICS' INSTITUTION.—The 152nd quarterly meeting was held on Wednesday evening, 4th December, in the lecture room of the Institution, Mr. T. A. Reed in the chair. It appeared from the report, read by Mr. T. J. Pearsall, the Secretary, that the receipts of the past quarter had been £237 18s. 7d.; the payments, £199 1s. 6d.; and the balance in hand, £38 17s. 1d.; the number of subscribers being 447. The efforts of the Donation Fund Committee to release the trustees from the liabilities and expenses incurred, had, by the repayment of the sums advanced by them in former years, lessened, in fact, the debt of the institution, by a reduction of liability of £312 19s. 10d. The lectures and classes were referred to as in a satisfactory state. The meeting itself was characterised by good spirit and good feeling, judging from the cheers which greeted the suggestions that were made for each individual to exert himself to increase the number of subscribers, and the proposals to hold some gatherings and entertainments for the benefit of the Institution. Reference was made to the success of the members of the Institution at the last annual Examination of the Society of Arts, and to the efforts of the Local Board of Examiners in promoting the efficiency of the classes. A prize of £5 has been offered by the Local Board to the members, for the best essay "On the judicious selection and right use of books," to be sent in on or before the 1st of June, 1862.

MEETINGS FOR THE ENSUING WEEK.

THURS...Philological, 8.

Royal Inst., 3. Professor Tyndall, "On Light" (Juvenile Lectures).

SAT.....Royal Inst., 3. Professor Tyndall, "On Light" (Juvenile Lectures).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, December 6th, 1861.]

2946. R. A. Brooman, 166, Fleet-street—An improved cup or vessel for administering liquids. (A com.)

2948. W. Bray, Abinger-road, Lower-road, Deptford—An improved locomotive apparatus particularly adapted to agricultural purposes.

Dated 24th November, 1861.

2952. J. B. Hulard and L. G. Poupel, Paris—An improved process for hardening stones and plaster of Paris, and making them impervious to water.

2954. G. Lowry, Salford—Certain imp. in machinery for carding and hackling flax, tow, and other fibrous substances.

2956. J. Goudie, Everard-street, Hartlepool—Imp. in reefing and stowing the sails of vessels.

2958. J. Willcox, Ludgate-hill—Imp. in sewing machines and in apparatus connected therewith. (A com.)

2960. J. H. Johnson, 47, Lincoln's-inn-Fields—Imp. in machinery or apparatus for shelling and cleaning rice and other grain. (A com.)

Dated 25th November, 1861.

2963. I. Davies, Larkfield Nursery, Wavertree, near Liverpool—Imp. in the construction of roofs for dwelling houses, horticultural erections, and other buildings.

2970. W. Sellers, Keighley, Yorkshire—Imp. in means or apparatus for sewing.

Dated 27th November, 1861.

2980. F. A. Calvert, Manchester—Imp. in machinery and apparatus for burring, carding, and combing wool and other fibrous substances.

2984. J. Cook, Glasgow—Imp. in pendent lamps.

2988. H. Mearning, 18, Great Randolph-street, Camden-town—An improved lucifer match and prepared paper for igniting the same.

2990. W. Clark, 53, Chancery-lane—Imp. in the clasps or fastenings of purses, bags, portfolios, tobacco pouches, and other like articles. (A com.)

2992. J. H. Soller, St. John-street-road—Imp. in cases for holding and supplying caps to the nipples of rifles and other fire-arms.

2994. M. Henry, 84, Fleet-street—Imp. in the manufacture of soap and the preparation of materials for the purpose. (A com.)

2996. S. Amphlet, Birmingham—An imp. or imps. in ornamenting surfaces.

[From Gazette, December 13th, 1861.]

Dated 26th August, 1861.

2117. F. Tolhausen, 35, Boulevard Bonne-Nouvelle, Paris—A new and economical method of producing dynamic electricity, thereby obtaining useful chemical compounds. (A com.)

Dated 28th August, 1861.

2141. J. Ronald, Liverpool—Imp. in machinery for dressing hemp, flax, manilla, and other like long fibrous material.

Dated 20th September, 1861.

2351. J. Oliver, Colchester, J. Grantham, 31, Nicholas-lane, W. Sincock, Sylvan-cottage, Woodford, Essex, and M. R. Leverson, 12, Saint Helen's-place—Imp. in the mode of obtaining certain chemical substances, and in the treatment of vegetable fibre, and in obtaining manurial and other products therefrom.

Dated 18th October, 1861.

2593. J. Crosthwaite and T. E. Arman, Liverpool—Imp. in the construction of targets, and in signal apparatus to be used therewith.

Dated 24th October, 1861.

2658. G. Davies, Serle-street, Lincoln's-inn—Imp. in lamps for burning coal-oil and similar fluids. (A com.)

Dated 30th October, 1861.

2726. E. De Bassano and A. Brudenne, Brussels—Imp. in the manufacture of stearine.

Dated 8th November, 1861.

2805. C. W. Siemens, 3, Great George-street, Westminster—A vessel, and gun or guns connected therewith, for use in naval warfare.

Dated 9th November, 1861.

2815. F. H. M. C. D. C. F. De Lacombe, Paris—Imp. in generating hydrogen gas for illuminating or other purposes, and in apparatus used therein.

Dated 11th November, 1861.

2827. D. Y. Stewart, Glasgow—Imp. in the manufacture of cast-iron pipes and in similar articles, and in apparatus to be used therein.

2832. A. Shannon, New York—An improved construction of cartridge for accelerating the flight of projectiles.

Dated 13th November, 1861.

2861. H. Bird, Liverpool—Imp. in the construction of bottles and other vessels, and in stoppers for the same to indicate that they contain poison.

Dated 16th November, 1861.

2885. E. D'Estanque, Mont-de-Marsan, France—An improved instrument for drawing teeth.

Dated 18th November, 1861.

2892. W. Clifff and E. Clifff, St. Quentin, France—Imp. in the manufacture of lace.

2897. A. C. M. Pouillet, Paris—An improved mode of constructing and fixing the rails of railways.

Dated 19th November, 1861.

2904. J. Lee, Church-gate, Leicester—Imp. in the construction of the wheels of traction engines, and in the mode of adaptation to such engines.

2906. S. Dedé, 13, Rue Duivier, Paris—A new process of discolouring, purifying, and improving varnish, oil, resin, gum, ether, wines, spirits, and other matters through the application of compressed air.

Dated 21st November, 1861.

2921. T. Cowburn, Manchester—Imp. in apparatus for elevating boiling soap and for dividing the same into bars when congealed.

2924. G. H. Polyblank, 55, Gracechurch-street—A new or improved method of protecting and preserving photographic and other prints, water-colour drawings, and other works of art from injury and decay.

2925. J. Gittos, jun., Westbromwich, and G. Hinton, Oldbury—Certain imp. in cupolas and furnaces for smelting or reducing ores and for the re-melting of pig iron.

2927. E. Brooks, Bradford—Imp. in machinery for combing wool and other fibrous substances.

Dated 22nd November, 1861.

2929. H. C. Meyer, Ashford-street, Hoxton—Imp. in the means of stopping or retarding railway and other carriages.

2931. A. F. Yarrow, Arundel-square, Barnsbury, and J. B. Hilditch, Barnsbury-villas—Imp. in locomotive steam carriages for common roads.

2937. C. Bartholomew, Broxholme, Wheatley, near Doncaster, and J. Heptinstall, Masbrough, Rotherham—Imp. in making circular blooms, such as are used in the manufacture of tyres and for other purposes.

Dated 23rd November, 1861.

2941. S. Sansum, Birmingham—An imp. or imps. in penholders.

2943. C. H. J. W. M. Liebmann, Huddersfield—Imp. in textile and felted fabrics.

2945. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in toothed wheels, and in the apparatus used in their manufacture. (A com.)

2947. J. Pitkin, Clerkenwell—Imp. in aneroid barometers.

2949. E. A. Rouvière, sen., 51, Rue de Malte, Paris—An improved pump.

Dated 25th November, 1861.

2957. W. Burgess, Newgate-street—Imp. in reaping and mowing machines.
2959. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for preparing oval picture frames. (A com.)
2961. A. V. Newton, 66, Chancery-lane—An improved method of removing and preventing the formation of calcareous and saline deposits in steam boilers. (A com.)
2962. J. Halford, Beacon-cottage, Great Barr, near Birmingham—Imp. in collecting and utilizing smoke, gases, and such like products of combustion, rendering the same available for heating steam boilers and other purposes where heat is required, which imps. are also applicable to the desulphurization of coal in making coke.
2963. G. Clarke, 16, Gresham-place, Camberwell-lane—An improved fire-escape.
2964. P. Cowan, Barnes, Surrey—A mode of utilizing the waste heat of furnaces used in reburning animal charcoal.

Dated 26th November, 1861.

2965. A. W. Willis, 28, Great Russell-street, Bloomsbury—Imp. in the construction of pencil cases or holders.
2966. C. G. Braxton, Portsea—Imp. in apparatus for propelling and steering vessels.
2969. R. Harcourt, Birmingham—An imp. or imps. in fastening knobs to doors, drawers, and other articles, and in connecting knobs to spindles.
2971. C. Stevens, 31, Charing-cross—Imp. in penholders. (A com.)
2973. G. Bottomley, St. George's-place, Leeds—Improved machinery for cutting up linen, cotton, woollen, and other rags, fibrous waste, or vegetable substances, for various purposes in the industrial arts.
2975. W. Firth and R. Ridley, Leeds—Imp. in apparatus and machinery for working coal and other mines.
2977. G. E. Donisthorpe, W. Firth, and R. Ridley, Leeds—Imp. in machinery and apparatus for working coal and other mines.
2978. G. L. Purchase, 23, Bedford-row—Improved sight apparatus and sight for firearms and ordnance.

Dated 27th November, 1861.

2979. J. Standfield, Stratford, Essex—Imp. in apparatus for regulating and indicating the speed of steam engines and other machinery.
2982. G. Rydill, Dewsbury—An improved Cornish or other steam boiler, with smoke consumer and condenser, being also applicable for ventilation.
2983. W. Leck, Glasgow—Imp. in weaving, printing, and otherwise treating certain ornamental fabrics.
2985. A. Whibley and T. Lumley, Gloucester-grove East, Old Brompton—Imp. in ventilators.
2987. A. Barclay, Kilmarnock—Imp. in machinery or apparatus for boring and winding purposes.
2989. A. V. Newton, 66, Chancery-lane—Imp. in moving and reaping machinery. (A com.)
2991. W. Clark, 53, Chancery-lane—Imp. in the construction of parts of electric telegraph belt apparatus, and in apparatus used in making the same. (A com.)
2993. M. Ohren, Sydenham—An improvement in the manufacture of gas and the apparatus connected therewith.
2994. W. Rowan, Belfast—Imp. in machines for heckling and scutching flax and other vegetable fibres.

Dated 28th November, 1861.

2997. H. Wilde, Manchester—Imp. in magneto-electric telegraphs, and in apparatus connected therewith.
3001. S. A. Carpenter, Birmingham—An imp. or imp. in attaching name plates or labels to umbrellas, parasols, walking sticks, and whips.
3002. P. Spence, Fawton Heath, near Manchester—Imp. in the treatment of ores for the manufacture of sulphuric acid, and in apparatus connected therewith, which apparatus is also applicable to the treatment of ores for separating metals therefrom.
3003. F. F. Weiss, Strand—An improved fastening for boxes and cases.
3004. W. A. V. Konig, Brompton-row, Brompton-road, Brompton—Imp. applicable to stoves or open fire-places for utilizing more of the heat therefrom than heretofore, also for economizing fuel and igniting same.
3005. J. D. de Labaume, 9, Dorset-terrace, Clapham-road—Imp. in machinery for cooling and freezing water and other fluids. (A com.)
3006. B. Pitt, 3A, Great Carter-lane, and J. J. Shedlock, 1, Wendale-villas, Earl's-court, Kensington—Imp. in cocks or valves for the passage of fluids.

Dated 29th November, 1861.

3007. E. Funnell, 54, East-street, Brighton—A self-acting indicator signal for railways.
3009. T. Ellis, Swindon, Wiltshire—Certain imp. in rails for permanent ways.
3010. A. B. Childs, 481, New Oxford-street—Imp. in wringing machines. (A com.)
3011. S. Tonks and J. Brookes, West Bromwich—Imp. in steam boiler plates.
3012. R. C. Perry, Manchester—An improved infant's feeding bottles.
3014. R. A. Brooman, 166, Fleet-street—An improved safety buffer or apparatus to be used in railway trains to prevent accident from collisions. (A com.)
3015. E. Tyer, 15, Old Jewry-chambers—Imp. in electric telegraphs.

Dated 30th November, 1861.

3017. W. Cooke, 26, Spring-gardens, St. Martin's-in-the-fields—A wind guard for curing smoky chimneys.
3020. E. Price, Cheapside—Imp. in collars for gentlemen's, ladies', and children's wear.

Dated 2nd December, 1861.

3021. A. Schultz, Paris—Imp. in the manufacture of certain colours for printing and dyeing fabrics.
3022. J. Wakenell, Hitchin, Hertfordshire—Imp. in the construction of invalid bedsteads, convertible into other articles of furniture for the use of invalids.
3024. G. Ralston, Tokenhouse-yard—Imp. in the mode of preparing and applying a certain material on the hulls of iron or wooden ships, or on the surfaces of materials for building the same, also for preventing oxidation and tubercles in iron water pipes. (A com.)

Dated 3rd December, 1861.

3023. J. H. Glew, Howland-street, Fitzroy-square—Imp. in machinery or apparatus for sewing or stitching.
3030. J. Leach, 19, Bronte-place, East-street, Walworth—Imp. in preparing matters to be used in the manufacture of candles.
3032. J. L. Field, Upper Marsh, Lambeth—Imp. in the manufacture of mould candles.
3034. W. E. Newton, 66, Chancery-lane—Imp. in artificial teeth (A com.)

Dated 4th December, 1861.

3036. J. Hemingway, Robert Town, Yorkshire—Imp. in the manufacture and ornamentation of textile fabrics.
3038. C. Crabtree, Bingley, Yorkshire—Imp. in paper tubes, and in the means or machinery for making or manufacturing the same.
3040. H. G. Hacker, Woodford-bridge, Essex—Imp. in machinery for the manufacture of chenille and other circular pile fabrics.
3044. R. A. Brooman, 166, Fleet-street—Imp. in albums or books for containing and showing photographic and other pictures, and in slides for the same. (A com.)
3046. C. S. H. Hartog, Norfolk-street, Strand—Imp. in the preparation and treatment of vegetable fibres, the better to adapt them for combining, working up, and dyeing with different fibres, such as silk, wool, cotton, and others, and in apparatus used in such treatment or preparation.

INVENTION WITH COMPLETE SPECIFICATION FILED.

3078. C. F. Varley, 4, Fortress-terrace, Kentish-town—Imp. in electric telegraphs.—9th December, 1861.

PATENTS SEALED.

[From Gazette, December 13th, 1861.]

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| <i>December 13th.</i> | 1563. J. Dunn. |
| 1352. J. Ronald. | 1568. T. Webb and J. Cragg. |
| 1539. F. Potts. | 1571. T. T. Jopling. |
| 1543. T. Gray. | 1588. C. Stevens. |
| 1545. D. B. White. | 1606. J. Church. |
| 1548. T. Routledge. | 1624. C. Stevens.] |
| 1551. J. Perry. | 1628. J. Fowler, jun. |
| 1556. F. Ziffer. | 1639. A. Lion. |
| 1557. R. Walker. | |

[From Gazette, December 17th, 1861.]

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| <i>December 17th.</i> | 1609. R. Ormerod. |
| 1555. J. Miller. | 1611. J. S. McArdle. |
| 1583. L. Hannart. | 1614. R. Moore. |
| 1587. H. Lawford. | 1619. J. Lafon. |
| 1589. W. E. Gedge. | 1625. C. Stevens. |
| 1590. A. N. Lesueur. | 1657. M. Lane. |
| 1591. R. A. Brooman. | 1670. W. Dingwall. |
| 1592. C. Hodgson. | 1873. J. F. Bourne. |
| 1593. C. Hodgson. | 2099. R. Telford and J. Sanders. |
| 1599. T. R. Harding. | 2204. J. K. Bayley, T. Harrison, |
| 1600. W. F. Henson. | W. Briggs, & R. Parker. |
| 1601. W. Hobson. | 2385. J. Cottrill. |
| 1602. W. Hobson. | 2654. J. H. Johnson. |
| 1603. J. Comrie. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, December 13th, 1861.]

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| <i>December 10th.</i> | <i>December 11th.</i> |
| 2837. C. Hodgson. | 2849. A. Rollason. |
| | 2975. W. Taylor and W. D. Grimshaw. |

[From Gazette, December 17th, 1861.]

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| <i>December 13th.</i> | <i>December 14th.</i> |
| 2864. R. A. Brooman. | 2873. J. Bullough. |
| 2867. J. Pendiebury. | 2876. J. Wardill. |
| 2874. C. F. Vassero. | 2884. J. H. Selwyn. |
| | 2921. R. Mushet. |

Journal of the Society of Arts.

FRIDAY, DECEMBER 27, 1861.

ADDRESS OF CONDOLENCE TO HER MAJESTY.

The following address of condolence has been forwarded to the Secretary of State for the Home Department, for presentation to Her Majesty:—

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

We, your Majesty's most dutiful and loyal subjects, the Society for the Encouragement of Arts, Manufactures, and Commerce, incorporated by Royal Charter, humbly approach your Majesty, with the assurance of our devoted attachment to your throne and person, and of our respectful sympathy with your Majesty in the great affliction which has so unexpectedly befallen your Majesty and the Nation, in the early death of His Royal Highness the Prince Consort.

Whilst the death of a Prince, distinguished by rare intellectual gifts and eminent virtues, is deeply lamented by all classes of your Majesty's subjects, his loss is especially deplored by this Society, which has for many years enjoyed the great advantage of his judicious counsel and support.

His Royal Highness was elected President in 1843.

His high position, his refined tastes, his enlightened judgment and his candour; his great command of general principles and his power of applying them to details; and his special knowledge on a great variety of subjects, extended the influence and greatly promoted the objects of the Society. Science, Art, and Literature were, by his judicious patronage, constantly introduced to the notice and recommended to the favour of your Majesty.

The great conception of the Exhibition of 1851, with its countless influences on the progress of human industry, was due to His Royal Highness, and in overcoming the difficulties of such a new and gigantic work, he solved the problem of conducting future Exhibitions, and their success will be an ever recurring memorial of their author.

The Society can never forget the obligations which His Royal Highness has conferred on them, and they humbly express a hope that the recollection of his virtues and of his public services may, with God's help, in some measure soften the intensity of your Majesty's affliction.

That your Majesty may long reign over a loyal and

devoted people, is the prayer of your dutiful and loyal subjects and servants.

By order of the Council, sealed with the seal of the Society for the Encouragement of Arts, Manufactures, and Commerce, this twenty-seventh day of December, one thousand eight hundred and sixty-one, in the presence of

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £442,750, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

Notwithstanding the number of days in the last week on which no work was done, partly on account of the national mourning, and partly in consequence of the Christmas holidays, the progress made is very apparent, and may be pronounced to be highly satisfactory. So far has the building now advanced, that it is beginning to assume an air of completeness, which promises well for the easy fulfilment of the contract within the appointed time.

The eastern dome is no longer a cause of anxiety; all the ribs are in their places; three of them are entirely finished, and the others only want the top jointings; in a short period it may be expected to be ready for the glaziers. All the wood-work of the lower portion is fixed, and only waits to be boarded to be protected from the weather. The brickwork of the great arch over the entrance, which has a span of about 80 feet, is completed.

It may be seen that the dome scaffold at the western end of the nave has a somewhat different appearance to its fellow before the raising of the ribs. This is owing to the arrangements which have been made to fix the ribs, which are different from those on the opposite scaffold, and promise an easier and more speedy accomplishment of that object. The brick arch over the western end is also finished, and the arrangements for fixing the ribs being completed, the task itself will soon commence.

The flooring has been carried over the whole of the south-eastern and south central courts;

this portion of the work proceeds with a rapidity which is truly marvellous. Visitors can now walk on dry plank flooring over the whole of the southern courts, as well as the long corridors underneath the picture galleries. The offices underneath the smaller or water-colour galleries are also fast approaching completion, so that the staff of Her Majesty's Commissioners will soon be enabled to transact business in the building itself when it may be determined to be more convenient to do so.

The brickwork of the refreshment courts has been executed in cement, and will not be affected by the frost. It is nearly finished. The joiners' and carpenters' works are also in a forward state, and there seems no reason why the structural portions should not be completed with the rest of the building, although such a condition does not form part of the contract of Messrs. Kelk and Lucas. The plastering and decorations will take some longer time. A suggestion has been made that Messrs. Minton should floor the part which forms the entrance to the horticultural gardens with tiles, for the making of which they have obtained so deservedly high and wide-spread a reputation.

Some experiments have been commenced in the nave for colouring the interior, and are still in progress. They are under the direction of Mr. Octavius Hudson, who has obtained so much credit for his works in Salisbury, Ely and Chester Cathedrals, and who is known for his great learning on coloured decoration. It is obvious that, as there are large surfaces in the present building, which did not exist in the building of 1851, a very different system of colouring will be required, as great quantities of the primitive colours, suitable enough for thin lines, would be inappropriate here.

The acceptances of space are being fast returned from British exhibitors; no less than 2,500 have been received since Saturday last. It is expected that the total number will reach 8,000.

The method adopted for the production of the Illustrated Catalogue appears to be received with favour; many pages have already been taken by exhibitors for the more detailed descriptions and illustrations of their goods.

The Imperial Commission at Paris has issued its 24th bulletin, by which it appears that the detailed plans for the arrangement of space are completed. Exhibitors are requested to act, as far as possible, in concert, in order to render the whole exhibition as harmonious and effective as possible. Many of the French exhibitors, after complaining of the smallness of the space allotted to them, and after obtaining twice that allotment, now state that they will be unable to fill even the space originally placed at their disposal. Such a course of conduct threatens to

disarrange entirely the plans of the Imperial Commission, who may be put to great inconvenience to induce fresh exhibitors to come forward and fill the vacant spaces. French goods are to be delivered at the railway stations by the 10th of March, under the penalty of having the space destined for them transferred to others.

EXAMINATIONS 1862.—NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The attention of Secretaries of Institutions and Local Educational Boards, is specially called to Par. 5 of the Programme of Examinations for 1862, as follows:—

5. A detailed list of the Chairman, Secretary, and other Members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1862. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Wherever this is the case, the names and addresses of the members, both of the District Board and of its Branch Boards, must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

ON THE PROSPECTS OF CLASS I. IN THE INTERNATIONAL EXHIBITION OF 1862.

By ROBERT HUNT, F.R.S.

In 1850 there was considerable discussion on the question of including native mineral produce in the Great Exhibition of 1851, which many persons thought should be confined to manufactures. The discussion eventually terminated in the formation of Class I, devoted to Mining, Quarrying, Metallurgy, and Mineral Products.

Her Majesty's Commissioners for the International Exhibition of 1862 have come to a similar determination, the only difference being that Class I. is now considerably extended, and several mineral and metal manufactures are embraced by it. There is great difficulty in knowing where to draw the line, and much confusion would arise in the arrangement of so large a collection of industrial products, unless some latitude was allowed. With mining and quarrying a tolerable degree of exactness might have been observed. The ores as raised from the earth, and the stones as broken out of the rock, with the appliances for facilitating the labours of man in those dangerous and difficult operations, would have been alone comprehended. Metallurgy opens a wide door, and we scarcely know when to close it. It may be said that the metallurgy of iron ends with the production of the pig-iron; but, is not a casting direct from the furnace, although it may be highly ornamental, as much a metallurgical process as the development of an ill-shaped pig? The production of a bar of iron or of a sheet is considered fairly a metallurgical operation, but it is not clear why a rolled rail is not equally so. Beyond this, in the Exhibition we have to deal with the dislike of the exhibitors to separate their manufacturing productions one from the other. Hence, in many cases, the unmistakable results of handicraft will be seen in connection with the products of the furnace.

Similar remarks apply to purely mineral products, and the visitors to this class, during the coming summer, will not be displeased to see many beautiful examples of workmanship in the stones and marbles of our own country, in contact with our native products in their crude state.

There appeared, at first, some apathy on the part of miners and quarrymen, and there were grounds to fear that our mineral products might be imperfectly represented. This was, however, dispelled soon after the formation of the National Committee. The first act of that body was to issue a circular, simply pointing out what it was desirable should be exhibited, and the response thereto plainly showed that the apparent indifference was referable to uncertainty and not to unwillingness. Many persons thought there could be nothing of interest in a mass of copper or lead ore, and others imagined that a block of sand-stone could have no value in an exhibition which aimed at surpassing everything that had hitherto been done in gathering works of the highest art together. When, however, they were informed that it was a desirable thing to exhibit the products of mines and quarries, the applications for space proved their desire to co-operate in the great work of the International Exhibition.

Before the 1st of October nearly twenty-six thousand square feet of floor-space were applied for, and all available wall space was, to a certainty, covered. This class, like every other, has suffered at the hands of Her Majesty's remorseless Commissioners, who, sitting like Terrestrial Joves, hidden by the clouds of their own Olympus, have given here a portion and there a portion, of the huge building, which rises so grandly and so rapidly on the Gore estate,—every portion being, by the common voice, declared to be too small.

The echoes of the murmuring committees were the first notes which broke upon the ears of the Commissioners—the prelude of a coming storm, which, penetrating from all quarters, for some time threatened serious damage. Tornadoes, cyclones, and common storms are the sooner exhausted the more powerful the exciting energy is at first. What is true of the tempests of nature is also true of the outbursts of the human breast.

The cry for more space, when there was no more to give “waxed fast and furious,” but having exhausted itself, it subsided into the expression of a desire to make the best of that which the Commissioners had given. No division importuned more earnestly to be enlarged than Class I. The committee in charge of this class were all men who have identified themselves with the mineral products of the country, and they seriously feared that the industry to which England—next to the indomitable spirit of her sons—owes all her greatness, was to be “cabined and confined” within a little more than two thousand square feet of floor space. These fears are being dispelled—the allotments have been made—the process of abridgment carried out with all the judgment which men, acting in ignorance of many of the conditions, could give, and, with a little anger—some murmurs, loud rather than deep—many petitions, in the best possible spirit—and the adjustment of evident misconceptions—all is subsiding into that quiet which indicates contentment.

The actual floor space within the building, which will be occupied by this class, will be about four thousand feet, in addition to which an open court will receive many of those things which will bear exposure, or such as exhibitors may be desirous of displaying, and may be willing to protect at their own cost.

The more experience we have in dealing with men, the more we are convinced that they are not so intractable as some have said them to be. There is a sound philosophy in the mode of reasoning adopted by the intelligent costermonger towards his obstinate quadruped. The principle of promising oats and hay, and persuasively saying, “Gee up, Edward,” is as unfailing with bipeds as it is said to have been with the four-legged creature of the story.

It is now time we should say a few words on the prospects of Class I, and its promise in comparison, especially, with the great Exhibition of 1851, and, incidentally, with the Paris Exhibition of 1855. That division of this class in which will be represented the metalliferous minerals of the United Kingdom will be of considerable commercial interest.

The Lead Hills of Lanarkshire, once the scene of a wild rush after gold, and always a district producing rare minerals, will send a series of their treasures. Lead ores and their products are coming from Durham, Northumberland, and Cumberland. The mountain limestone regions of Yorkshire will furnish lead and copper, and Cardiganshire and Flintshire will exhibit varieties of their galenas and blendes. The local committees of Exeter, Tavistock, and Redruth, are carefully looking up the more remarkable examples of the minerals of Devonshire and Cornwall. That tin ore which has been worked in Cornwall and on Dartmoor for more than two thousand years, and which is now being obtained at the rate of ten thousand tons per annum, will be shown as obtained from the stream and from the mine. Several varieties of copper ore, many of the rich argentiferous lead ores of the West, the zinc ores of these counties, the sulphur ores (iron pyrites) and many others, not quite so important, but remarkable as being rare, are to be amongst the illustrations of nature's bounty to us. Ireland, too, sends over her lead, copper, and pyritic ores.

Although the Exhibition of 1862 will not exhibit such a complete collection of iron ores as the industry of Mr. S. Blackwell brought together in 1851, yet most of the new discoveries, and they are many and important, will find a place. The iron ores of Weardale, those of Cleveland, and the recent discoveries in the West Riding of Yorkshire, the remarkable deposits of Lincolnshire, those of the Midland Counties, and the best examples from Somerset, Devon, and Cornwall, will form an interesting series. Amongst the metalliferous minerals, examples of gold from Devonshire will be found; but of the more important gold quartz of Merionethshire we hear nothing.

Coals promise to be abundant. There is scarcely a useful seam from which an example will not be sent. In 1851 there were some gigantic blocks, many of them of little interest, and showing no more of the quality of the coal than would have been shown by a smaller specimen. We hear but little of such masses now. Two or three exhibitors desire to show the entire thickness of the seam they work, and a very few have some peculiarity which can only be seen in a mass of good size; cubical pieces of about eighteen inches will be the rule. In most cases, the local committees have endeavoured to prevent reduplication, and, in others, the specimens to be exhibited have been determined by the Coal Trade Associations.

Of the earthy minerals there will not be a large display. Fuller's earth, Barytes Chalk, sands for glass making, and polishing powders are, however, amongst the lists of things for which space has been applied for.

Dorsetshire sends its celebrated Potter's clay, and from the neighbourhood of Newton Abbot, in Devonshire, several examples of the so called “Teignmouth clay,” (because it is shipped from that port), and specimens of articles manufactured from it, will be exhibited. The kaolin or porcelain clay of Dartmoor, and from the extensive clay works around St. Austell, in Cornwall, will form an interesting series. The fire clays of the coal measure districts of the Midland and Northern Counties, with gas retorts, glass-house pots, and other manufactures from them, will be fully shown. Here, as in many other divisions, there arises what we may term an overlapping of the classes. Class 35 is devoted to pottery, and should include all the manufactures, but many of the exhibitors prefer placing in Class I, with their clays, the articles made from that material. Melting pots and crucibles have been placed in Class 35; but the makers of them, regarding them as truly metallurgical, prefer seeing them in Class I.

The building and ornamental stones of the kingdom promise to be fully represented. The sandstones of the coal measures of the North; the dolomites of Yorkshire and the neighbouring counties; the Liassic limestones, the oolites, especially those from the neighbourhood of Bath; Portland stone, Purbeck marble, Stonesfield slate, and numerous other varieties, will illustrate our richness in

the materials of construction. Granites, from Scotland, from Leicestershire, and from Cornwall, will form prominent objects, since many large examples will be elaborately wrought, and some of them highly polished. The Serpentine of Cornwall, certainly the most beautiful ornamental stone of these islands, will be exhibited in some new and interesting forms. The Irish serpentine, or Connemara marble, will also form a striking object.

The true marbles of Devonshire and those of Derbyshire will come forth prominently. Several tables are manufactured from them; and ornamental vases and other things have space reserved. We learn that the vases made from the black marble of Derbyshire will be of unusual size and great elegance.

The Port Madoc local committee promise a good series of slates and slabs, while the Llangollen quarries will send one of the largest slabs ever got out of a quarry. The articles, such as chimney pieces, tables, &c., manufactured from slate and enamelled, will be numerous.

Many models illustrating mining operations are in progress of construction, some of them of large size, and very instructive. Sectional models, as of the iron deposits at Whitehaven; of the copper and tin lode at Dolcoath, in Cornwall, made from the rocks themselves, and thus showing the actual conditions, will add greatly to the interest of this section. Models of plans for ventilation; models of safety cages, and actual safety cages, will be shewn, as will also several machines employed in "dressing" the metalliferous ores for the market.

From this rapid sketch it will be evident that the mineral produce of the country will be fairly illustrated.

In metallurgy, the examples of iron will be numerous, and, at the same time, as nearly all varieties of pig iron will be found in the Exhibition, there will be some of the most remarkable examples of rolled iron that have ever yet been shown. Rails from 60 to 100 feet in length without a weld; bars of remarkable size and length; sheets of iron of most unusual dimensions; and armour plates which have resisted the battering power of Armstrong's guns, will be there. Cranks, one weighing above 20 tons, and beams of singular size and strength, will prove the capabilities of British forges. Tin plates will be well illustrated, but the smelters of tin are not patriotic enough to aid in this industrial movement, and unless the Redruth Local Committee persuades a Cornish smelter to exhibit, the most ancient metallurgical process of the country will not be seen.

The metallurgy of copper, on the contrary, will be fully illustrated, as will that of zinc, lead, and silver, with the refining of cobalt and nickel. Even gold, platinum, and other precious metals, will be shown in their processes of refining and the like, tin alone being unrepresented. Space has been secured by exhibitors, perhaps not so much as they may have desired, but still, we hope, ample for the exhibition of the more striking objects. Let us hope that there will be a unanimity of feeling amongst them, and that in the difficult task of arrangement there will be shown an accommodating spirit. It would be in the highest degree desirable, if the exhibitors could, by communicating one with the other, obviate that reduplication of articles which will possibly arise if each one works in ignorance of the plans of his neighbour. Every one is aware that the manufacturer looks to an exhibition of this high character as a means for making him better known to the world, and it is intended that this should be one of the objects. But let it never be forgotten that the great end in view is an educational one. We are to learn, from the works of other countries, to improve our own manufactures, and in return, we are to impart to the strangers who visit us, information which will be valuable to them. By the collision of minds new truths are developed; by an industrial contest fresh powers are called into play, and the world is benefited by the production of something which either adds to the pleasures of existence, or ministers to the necessities of man.

CARBURATION OF GAS.

A careful experiment as to the efficiency of this process was made last summer by direction of the Commissioners of Sewers for the City of London, and the following are extracts from reports by Mr. Haywood, engineer to the Commissioners, and Dr. Letheby, Medical Officer of Health:—

"The patent of the United Kingdom Carburing Gas Company is for placing near to the gas burners a receptacle containing coal naphtha, the gas passing through or over this takes up, and becomes enriched by, the addition of the volatile hydro-carbons contained in the naphtha, and the illuminating power of the gas is thereby increased; the quality of the naphtha employed determines mainly the degree of illuminating power gained, and the chemical and photometrical experiments show that it varies from 25 per cent. to 77 per cent.*

"Moorgate-street, lighted by the Chartered Gas Company, was selected as well adapted for the experiment, there being an equal number of lamps upon each side of the way, but one or two private lamps only in the street, and but few shops; the street is, therefore, after an early hour of the evening almost entirely without artificial light, excepting that which it derives from the public gas lights.

"The patentees stating, that by the application of their process equal light would be given with half the ordinary consumption of gas, the burners were regulated accordingly. The lamps experimented upon were twelve in number, six upon the western side, which were fitted with the ordinary batswing burners calculated to consume upon the average of the night 5 cubic feet of gas per hour, and six upon the eastern side, fitted with batswing burners calculated to consume $2\frac{1}{2}$ cubic feet per hour. The latter burners having attached to them the carburing apparatus of the company, each of the twelve burners had a meter attached to it, to ascertain the actual consumption. No pressure regulators were fixed upon the lamps.

"The registration commenced upon the 19th of June, and terminated upon the 19th of July inst., the experiment extending therefore over thirty nights, and gave the following results:—

"That the burners without the carburing apparatus consumed about 4.39 cubic feet per hour.

"That the burners fitted up with the carburing apparatus consumed 2.09 cubic feet per hour.

"No photometer was employed, the equalization of the

* The apparatus consists of a chamber for holding coal naphtha, and of a contrivance for directing the stream of gas over the surface of the naphtha. By this means the gas becomes charged with volatile hydro-carbons, and acquires a higher illuminating power. Three sets of experiments were made for the purpose of determining the value of the apparatus. In the first set a naphtha rich in benzole was employed, and the results were, that at first it raised the illuminating power of ordinary twelve-candle gas to twenty-four candles, and in the course of three days the power fell to eighteen candles, the mean of the whole being twenty-one candles. This is an increase of 77 per cent., and it was effected by giving 10.77 grains of naphtha vapour to each cubic foot of gas. In both of the other sets of experiments an inferior kind of naphtha was used, and in one case the average increase of illuminating power, during a period of ten days, and after the passage of a thousand cubic feet of gas, was 25 per cent. In the other case, after a duration of five days, the average increase was 30 per cent. The former was effected by the addition of four grains of naphtha vapour to each cubic foot of gas and the latter by 6.56 grains. These data are sufficient to indicate the general capabilities of the apparatus, for they show that with a good naphtha, supplied in proper quantity, and furnishing from ten to eleven grains of vapour to each cubic foot of gas, the illuminating power of an inferior gas may be nearly doubled. A less volatile naphtha, giving only from four to seven grains of vapour per cubic foot, will increase the power of twelve-candle gas from 25 to 30 per cent. I am, therefore, of opinion (says Dr. Letheby), that the apparatus is of practical value as a carbureting agent, and that if supplied with good naphtha, in proper quantity, there will be no difficulty in sustaining a power of twenty candles with ordinary coal gas.

amount of light given by the two classes of burners was a matter of judgment. The District Inspector of the Commission, who saw the lights nightly, reports his opinion that the light given was perfectly equal, and that his opinion is strengthened by collecting those of certain residents in the neighbourhood. Mr. Haywood's opinion is that the light of the 2½ feet burners was upon the average of the month inferior, although but very slightly so, to that of the 5 feet burners. The Inspector of the Chartered Company coincides with him in this.

"No chemical analysis was made of the naphtha used; but it is stated by the patentees to have been of the best quality.

"The deduction from the experiment is, that with naphtha of equal quality to that used, during the warm months of the year 3 cubic feet of carburated gas may be considered as about equal to 5 cubic feet of gas not carburated.

"Assuming these to be data applicable to all seasons of the year, Mr. Haywood estimated the saving to be effected by the process, and after allowing for the cost of the apparatus, and for periodically filling it with naphtha, and after giving credit at the present price of the gas supplied to the public lamps for the quantity not consumed, it shows that the reduction in the cost of each public lamp will be at least £1 per annum; and their being 2,825 lamps within the City, that a saving of about £2,825 would be annually effected.

"The only disadvantage observed during the experiment was that the reservoir, as constructed, throws a disk of shadow round the base of the gas lamp standard, but the depth of shadow is but slight; this advantage may be largely rectified by an alteration in the form of apparatus.

"Mr. Haywood does not pledge himself to any of these figures as exact, for the experiment as conducted cannot lay claim to be considered minute or exact in its character; but he believes it may, nevertheless, be taken as giving a close approximation to the truth; it is the mean of the rough results of practice, and the refined processes of the laboratory from which reliable data are generally drawn; in this case the results of the experiment are supported by laboratory experiments, and consequently there seems but little doubt that this mode of applying naphtha to the public lights (for the naphthalisation of gas itself is by no means new), may lead to a considerable reduction in the cost of public lighting; but what that reduction ultimately would be, would depend upon points which can only be determined by the application of the process to a considerable number of lamps for some length of time, and at different seasons.

In a more recent report, the above gentlemen say:—

"With regard to the carburating process, we are of opinion, from the data obtained by the laboratory experiments quoted in the report to the Commission of the 30th July last, and the experiments made on the public lamps in Moorgate-street, during the months of June and July last, that the process of carburation appears to be capable of economising the use of gas in the public lamps, to the extent of from 40 to 50 per cent. This conclusion is founded on the assumption that the best quality of naphtha is to be used, namely, a naphtha which will give to the gas continuously a proportion of about ten grains of volatile hydro-carbon to each cubic foot of gas, these being the average results of the laboratory experiments. If an inferior kind of naphtha be employed, the results will be less satisfactory; for the laboratory experiments show that a naphtha yielding four grains of volatile hydro-carbon will increase the illuminating power of the gas to only about from 15 to 20 per cent."

RAILWAYS IN HOLLAND.

The following communication has been received from M. J. W. Del Campo, of Holland:—

"Railways may now be regarded as necessities of life,

and, however high were the expectations of the invention of Stephenson, we have not been disappointed; on the contrary, wherever the steam locomotive has appeared, prosperity has increased, isolation and ignorance have given way, traffic and civilisation have advanced. It is astonishing, therefore, that this valuable means of communication is not more generally used in some countries, so as to increase still more considerably their commerce and industry.

"How was it that a country like Holland, generally known and highly esteemed for its trade and industry, did not avail itself of railways, so as to keep pace with the general progress in other countries? Its most flourishing provinces, where the cultivation of the soil and the breeding of cattle have made great progress, are completely separated from the general means of communication; their products are sent to the nearest harbour to be embarked for the great metropolis of the world, while persons travel by stage coaches, like those used half a century ago in England.

"The great inclination of the people for water communication, the great difficulties of constructing railways over rivers and arms of the sea, which penetrate the country and form many islands; the fact that their construction could not be a profitable enterprise for any private company, and the hesitation on the part of Government to undertake their construction itself against the rules of a sound policy may account in some way for this. However, these are not to be considered as valid reasons for being deprived of railways, and, if they are now considered advantageous, why were they not so ten years ago? When the nature of the country made private companies hesitate to construct them, why should not the Government have done it? There are, indeed, very few railways which have been profitable to the companies, but who can tell how many millions they have increased the wealth of the people, or how much they have contributed to their civilisation and welfare?

"I am glad, however, to be able to say that railways are now being constructed in Holland. The Government is making use of its able civil and military engineers to overcome the difficulties of crossing the rivers, and has in view the carrying out of a complete railway system within ten years. There will be constructed about 900 miles of railway, at an expense estimated at £7,000,000, of which a third part is to be expended on railway bridges only. These railways will unite the following towns:—Amsterdam, Hague, Rotterdam, Breda, Maastricht, Utrecht, Amhem, Zutphen, Assen, Harlingen, New Diep, and others.

"Besides the railway, a canal will be made to unite the capital, Amsterdam, immediately with the ocean.

"This railway system will be beneficial to the country, the production of the soil and of industry increasing in proportion as the means of communication improve, and will be at the same time of much importance to Great Britain. The commercial towns of Holland will thus be brought nearer to England's sea ports, and the intercourse will be greater. It must be beneficial to both countries, whose histories are so connected with each other. In the great battle for liberty, they have both marched in the same course; in the promotion of commerce, they both have shown themselves energetic and successful. May they always work together to promote civilisation, to cultivate peaceful sentiments, and increase the welfare of their populations."

NEW BLACKFRIARS BRIDGE.

At the last meeting of the Court of Common Council, the report of the committee on the subject of the new bridge at Blackfriars was read.

It appeared to the Committee, after mature deliberation, that the best mode of satisfactorily answering the reference was to request the most eminent civil engineers to send in designs and estimates for the contemplated struc-

ture. Accordingly, invitations for that purpose were forwarded to Mr. P. W. Barlow, Mr. G. P. Bidder, Mr. Joseph Cubitt, Mr. John Fowler, Mr. John Hawkshaw, Mr. Thomas Page, Sir John Rennie, and Messrs. Walker, Burgess, and Cooper, accompanied by an intimation that, having regard to the Royal Commission then sitting for embanking the Thames, and to the probability of an embankment being carried out to some extent, it was essential that provision should be made for that contingency in the designs for the new bridge. They were also reminded that the London, Chatham, and Dover Railway Company had submitted to the Corporation of London a plan for the construction of a railway bridge across the Thames to the eastward of Blackfriars bridge. Subsequently, applications were received and complied with for permission to send in designs from Mr. R. P. Brereton, Mr. James Brunlees, Mr. Thomas Greenhill, and Mr. R. W. Mylne. The committee considered it prudent to leave the judgment and taste of the scientific gentlemen invited to compete wholly uncontrolled and unfettered, so as to obtain the most original suggestions, and afford each an opportunity of explaining the reasons which had guided him in the preparation of the design. Their anticipations had been fully justified by the results, and in every instance the engineers had satisfactorily shown they had carefully considered the most important requisites in connection with the subject, namely, the approaches to the proposed new bridge; the roadway and footway over it; the provisions for the navigation of the river in the headway and waterway under the various arches; and otherwise in providing for the progressive increase of traffic in the locality of the bridge, and for the temporary traffic during the erection of the new structure. The designs submitted were twenty in number, and comprised four for a stone bridge, five for one of wrought iron arched, one for a wrought-iron girder bridge, nine for a cast-iron arched bridge, and one for an iron bridge, but not clearly indicating whether of wrought iron or cast. The designs so sent in had been exhibited for several months at Guildhall. Those for a granite structure were submitted by Sir John Rennie, of three arches, the centre span being 236ft. 10in.; Mr. George Rennie of five arches, the centre span being 150ft.; Mr. George Rennie, another, of five arches, each span being 125ft., and Mr. R. W. Mylne, of five arches, the centre span being 156ft. 6in. The designs for a wrought iron arched bridge were those submitted by Mr. John Fowler, of three arches, with a centre span of 275ft.; the same gentleman, one of five arches, the centre being 185ft.; Mr. John Hawkshaw, of three arches, the centre and other spans being 200ft. each; the same gentleman, one of five arches, the centre and others being 145ft. each; and Mr. P. W. Barlow, of three arches, the centre being 250ft. The design for a wrought iron girder bridge was submitted by Mr. R. P. Brereton, of five openings, the centre being 220ft. Those for a cast iron arched bridge were sent in by Mr. Thomas Page, of three arches, having a centre span of 280ft.; the same gentleman, one of five arches, with a centre span of 156ft.; Messrs. George P. Bidder and Edwin Clark, of five arches, each being 175ft.; Mr. George Rennie, of five arches, with a centre of 160ft.; the same gentleman, of five arches, with a centre of 175ft.; another, of five arches, having a centre span of 180ft.; Mr. R. W. Mylne, of five arches, with a centre of 166ft. 6in.; Mr. Joseph Cubitt, of five arches, having a centre span of 150ft.; and Mr. James Brunlees, of five arches, having a centre of 172ft. The remaining design for an iron bridge was submitted by Mr. Thomas Greenhill, of seven arches, having a centre span of 120ft.; with a tube for a railway, and he stated that it might be converted into a five-arched bridge. During the consideration of the several designs the committee had regard to the length of time necessarily occupied in the construction of a bridge of stone more than of one with iron arches, and to the facts that the depth required at the crown of the arches of a stone bridge would prejudicially affect the gradient of the approaches and roadway of the bridge, and

that the cost of a stone bridge was in all cases so much more than of those of iron; and they came to the conclusion that it was not desirable to adopt a design for a stone bridge. They held it essential to preserve the present lines of approach to the proposed bridge on the north and south sides of the river, and that the centre line of the new bridge should correspond with the centre line of the present approaches. Adverting to the circumstances that London has become augmented in population and extent exceeding that of any other European capital; that its wealth has increased in far more than a proportionate rate; that it is the seat of government and legislation; and that in the exact locality and vicinity of Blackfriars were being constructed the termini of the most important railway undertakings, which would lead to an increase of traffic the amount of which could not be over-estimated, the committee are of opinion that great urgency exists for all municipal and local authority to be energetically exerted to provide for the obviously certain and enormous requirements that will shortly arise for traffic accommodation. Actuated by these considerations, and desiring that the city of London should hold its place, deservedly eminent as it is for the useful exercise of its ancient municipal rights in the promotion of the comfort and convenience of the public, which are to be partially secured by the provision of proper means of intercommunication from one part of the metropolis to the other, as well for purposes of social as commercial and manufacturing pursuits, they think that the present opportunity should not be lost of maintaining a well-earned reputation, in contributing extensively to the architectural decoration and beauty of the metropolis, of which, even at this day, so many exquisite and perfect examples are to be found in the city of London. They are also fully impressed with the actual necessity for providing abundant facilities for the navigation of the river; for the transit of merchandise, and for passengers by road and footways. They have likewise had due regard to the time within which the proposed structure may be erected, and they submitted for the approbation of the court the design of Mr. T. Page, for a bridge of three iron arches, on granite piers, believing it to be best calculated to meet the requirements of the public. No disturbance of the traffic would take place during its construction, provision for that being made without a temporary bridge; and Mr. Page had estimated the expense of executing the whole of the requisite works at £245,000. They cannot, they say, but acknowledge the manifest grandeur of the style and beauty of the proposed structure, which they deem worthy in all respects of this great municipality. They, therefore, recommend the design of Mr. Page for adoption, omitting, however, the sculptured ornamental groups on the piers, such being merely suggestive that the corporation may at some future time, if so minded, in so conspicuous and suitable position, have the opportunity of commemorating any event or circumstance of national importance. They also recommend that in the event of the court adopting his design, Mr. Page be retained as the engineer to superintend the requisite works.

RAILWAY BILLS FOR 1862.

The plans and sections of proposed works specified in the following railway Bills have been deposited at the Board of Trade for the ensuing session of Parliament:—

Abbeyholme, Leegate, and Bolton; Aberystwith and Welsh Coast; Alford-valley; Andover and Great Western; Andover and Redbridge; Andover, Redbridge, and Southampton.

Bala; Bala and Dolgelly; Balham and Putney Junction; Banstead and Epsom Downs; Barnsley Coal; Berkshire; Birkenhead; Birkenhead, Flintshire, and Holyhead; Birkenhead and West Cheshire Junction; Bishop Walton, Botley, and Bursledon Down; Bognor, Chichester, and Medhurst; Bradford, Wakefield, and Leeds; Breckdown and Weston-super-Mare; Brecon and

Merthyr Tydvil; Bridge of Weir; Bristol and South-Western Junction; Bristol and Clifton; Bristol Port and Pier; Bristol and South Wales Union.

Caledonian (branches); Caledonian (deviations); Cannock Chase Extension; Cannock Mineral Extension; Carnarthen and Cardigan (extension and branches); Carnarvonshire; Carlow, Tullow, and Newtonbarry; Cork and Youghal; Cork, Middleton and Fermoy; Corwen, Bala, and Port Madoc; Cowbridge, Cowes, and Newport; Crystal Palace and South London.

Daventry Extension; Dayton Junction; Deeside Extension; Dowlais Valley Mineral; Dove Valley; Dublin Metropolitan; Dundalk and Enniskillen (Extension).

Eastern Counties (Wisbeach and Peterborough); Eastern Counties (extension at Colchester); Eastern Counties (new lines in Middlesex); East Gloucestershire; East Grinstead; Groombridge and Tunbridge Wells; Eden Valley; Edgware, Highgate, and London; Edinburgh, Dunfermline, and Perth Junction; Edinburgh and Glasgow (extension); Ellesmere, Ruabon, and Shrewsbury; Ellesmere, Oswestry, Ruabon, and Shrewsbury; Enniskillen and Bundoran (extension to Sligo).

Fermoy, Lismore, and Dungarvan; Frosterly and Stanhope; Furness.

Garston and Liverpool (deviations); Glasgow and Renfrew Junction; Great Northern, No. 1; Great Northern, No. 2; Great Northern and Western of Ireland; Great Western (additional powers); Greenock and Wemyss Bay.

Hammersmith, Brentford, and Kew; Hatfield and St. Albans; Hereford, Hay, and Brecon; Holbeach Junction; Horsham, Dorking, and Leatherhead; Hull and Hornsea; Hull and West Riding Junction.

Isle of Wight.

Keighley and Worth Valley; Kent Coast; Kensington Station, and North and South London Junction; Kettering and Thrapstone; Kingston and Eardisley.

Lancashire and Yorkshire (Doncaster, Goole, and Hull Junction); Lancashire and Yorkshire (additional powers); Launceston and South Devon; Leeds, Bradford, and Halifax Junction; Ledbury and Gloucester; London, Brighton, and South Coast (enlargement of stations); London, Brighton, and South Coast (new lines); London and Blackwall; London, Chatham, and Dover (junction at Battersea); London, Chatham, and Dover (extension to Walmer and Deal); London, Edgware, and Bushey; London and Midland; London and North-Western (additional powers); London and South-Western (additional powers); London and South-Western and Andover and Redbridge; Lostwithiel and Fowey; Llanidloes and Newtown, Mid-Wales, and Manchester and Milford; Llanelly; Lymington; Linton and Dolphinton.

Manchester, Sheffield, and Lincolnshire (additional powers); Manchester, Sheffield, and Lincolnshire (central station in Liverpool); Manchester and Milford Rhyader branch); March and Askern; Marton and Hanbury; Maryport and Carlisle; Market Drayton and Newport; Metropolitan; Metropolitan and Thames Valley; Merionethshire; Midland (Rowsley and Buxton); Mid-Wales (deviations); Mid-Wales (branch); Mid-Wicklow; Mid-Kent and Addiscombe; Mid-Sussex and Midhurst Junction; Mold and Wrexham; Mortonhamstead and South Devon.

Nantlle; Newport and Ryde Direct; Newcastle (deviation); North British (Monkton Hall, Omristown, and Dalkeith branches); North Devon and Okehampton; North-Eastern (Market Weighton, Beverley, and Hull branch); North-Eastern (Hull and Doncaster); North-Eastern (Blaydon to Conside); North-Eastern (Branch Valley); North Metropolitan Junction; Norwich and Spalding.

Oswestry, Ellesmere, and Whitechurch; Oswestry and Newtown, Llanidloes and Newtown, and Shrewsbury and Welchpool; Oswestry, Shrewsbury, and Ellesmere.

Parsonstown and Portlanna, Radstock and Keynsham; Ramsgate, Sandwich, Deal, and Dover; Rickmansworth, Amersham, and Chesham.

Sevenoaks; Severn and Wye; Scottish Central;

Scottish Northern Junction; Scottish North-Eastern; Shrewsbury and Hereford; Shrewsbury and Welchpool; Sidmouth; South-Eastern (Tunbridge and Dartford lines); South Yorkshire (Sheffield and Thorne); South Yorkshire (Extension to Hull); South Leicestershire (deviations); Southampton and Netley; Southampton and Isle of Wight; South Staffordshire and Central Wales (Dudley and Bridgnorth); Spalding and Bourn; Stamford and Essendine; Stafford and Uttoxeter; Stockton and Darlington (Towlaw and Crook); Swansea, Neath, and Brecon Junction.

Tendring Hundred; Tewkesbury and Malvern; Thames Embankment (North and South); Tottenham and Hampstead Junction.

Uxbridge and Rickmansworth (deviation).

Vale of Clwyd; Victoria and Pimlico.

Waterford and Limerick and Limerick and Ennis; Wellington and Cheshire Junction; Wellington, Drayton, and Newcastle; West Cheshire; West Hartlepool (Dock Extension); West Galway, West Riding, Hull, and Grimsby; West Midland (Merthyr, Tredegar, and Abergavenny, lease and extension); West Midland (additional works); West Shropshire Mineral; Whitechurch, Wrexham, Mold, and Connah's Quay Junction; Weymouth and Portland.

THE OIL SPRINGS OF AMERICA AND CANADA.

Mr. Alexander Macrae, oil and produce broker, of Liverpool, in a circular dated 16th December, says:—

"The introduction of petroleum, kerosine, photogene, or rock and well oil, is making tremendous strides, though it does not surpass the prediction in my first circular, namely, that it would be second only in extent to cotton. I will even go a step further, and venture to assert that if the rocks and wells of Pennsylvania, Canada, and other districts continue their exudation at the present rate of supply, the value of the trade in this oil may even equal American cotton. Montreal (internally, and likely externally by this time) is lit with the white refined, and I can see no reason why London and Liverpool should not also be, for the oil gas distilled from the raw petroleum is immensely superior and much more brilliant than our own coal gas. For years we have sent coals to America for gas works, and it will be a singular freak of events if she and Canada should now supply us with a better expedient. Invested interests will perhaps stay it for the moment, but will they ultimately?"

"The refined for burning (known in this country as paraffin oil, and of which about 500 tuns a week are sold), has been selling at £30 to £40 per tun (of 252 gallons) for yellow to white, while the crude varies in value from £6 to £25, according to test. The merits of the petroleum will be better understood when importers are informed that besides the uses already named, lubricating oils of every colour and specific gravity can be obtained from it; wax also for the manufacture of paraffin candles, naphtha, and consequently benzole (from which the fashionable dyes, magenta, rosine, aniline, &c., are obtained), pitch, &c., &c., all of them having several other applications. It is reported on the very best authority, that they have discovered from it now, an available substitute for spirits of turpentine for paints, and also a solvent for india-rubber, results, I understand, that they have not effected in America or Canada, and the importance of which cannot be over-estimated.

"In my first circular it was stated that some 7,000 barrels of crude and refined were on the way to this country, and the *Times* of the 13th inst., mentions 8,000 barrels on the way to London. There are 10,000 barrels coming to Liverpool, and 2,000 barrels to Glasgow, in all about 20,000 barrels (or £100,000 sterling, and the trade not six months old), a simple tithe of what we want! American hostilities and the ice in the St. Lawrence (although we have still St. John's, New Brunswick) may stop supplies to some ex-

tent, but I have no doubt the future will vindicate the expectations I have so frequently expressed."

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(Continued from page 34.)

PRODUCTS OF PERU.—(Report by Mr. Wilthew, British Consul at Islay, on the Trade of that Port.)—Islay is a small town in the department of Arequipa, built on a rising ground overlooking the bay, skirted on the north by the coast range of hills (the highest of which, San Andres, serves as a good landmark for vessels visiting the port), and having a sandy plain towards the east and south. The houses are mostly of wood. The population is about one thousand—an indolent race. The climate delightful. There are a governor of the town, captain of the port, custom-house employés, and a magistrate. There is only one Consul resident at Islay, that of her Britannic Majesty. The harbour is safe, though small; but subject occasionally, during the winter season, to a heavy swell, which sets in from the south-west. The anchorage is good, and there is deep water to within a few yards of the shore, which is bold and rocky. The mountain of San Andres before mentioned, the highest on this part of the coast, bears from the anchorage, north-and-by-east-half-east, by the compass. There is a small mole, principally of iron, erected in the year 1853, which renders the landing of goods and passengers much more easy and safe than before, though even now, during the winter season, the former cannot always be landed on account of the heavy swell. The port charges are two reals per ton on the registered tonnage, and eight dollars anchorage for vessels proceeding from any foreign port, and six dollars anchorage if from a Peruvian port, where the charges have been already paid; besides which, in either case, four dollars and a-half to the captain of the port for license, visit, &c. Formerly, there was a duty of one per cent. levied on all packages landed and embarked, as a mole duty, but that is now done away with. The steamers of the Pacific Steam Navigation Company call four times a month:—on the 1st and 16th on their way from Panama to Valparaiso, and on the 7th and 22nd on their return. Vessels seldom come direct from Europe to this port; they generally touch first at Arica, where, if they discharge they take in barilla (copper ore), and complete their cargo here with wool and Cascarilla (bark). Islay is the port of entry for the departments of Arequipa, Puno, and Cuzco; and, after Callao, is the port of most importance in the public of Peru as regards the amount of duties furnished to the Government by the Custom-house. The exports from Islay consist of wool, bark, and a small amount of specie. The wool brought from the departments of Puno and Cuzco to this port for exportation is from the sheep, llama, the alpaca, and the vicuña. Besides sheeps' wool, of a very ordinary quality, there is also a superior quality shipped, the breed having been much improved of late years by the introduction of rams from England, and likewise of Merino sheep from Australia. The wool of the llama is very coarse, and very little is exported. The alpaca wool is generally in great demand, and a large quantity of it is yearly shipped from this port. The vicuña is wild, and grazes on the tops of the highest mountains of the chain of the Cordillera; sometimes 15,000 feet above the level of the sea. These animals are caught by the Indians, and killed, and their skins brought to Arequipa, where the wool is taken off. Notwithstanding, there is no apparent diminution in their numbers.

In the time of the Incas the vicuña was a domesticated animal. On account of the great demand for alpaca wool, owing to the great number of materials now manufactured from it, these animals are much more taken care of than formerly by their owners the Indians, and have greatly increased in number. An attempt has

been made to cross the breed of the alpaca with the vicuña, and it has succeeded on a small scale. The wool produced by this breed is even more soft than that of the vicuña, and of a more silky texture; but, on account of the difficulties attending the breeding of this animal, called paco-vicuña, it will, I fear, never prove of any general utility. The person who conceived the idea, and who has succeeded in procuring the breed, enjoys a pension of six hundred dollars from the Peruvian Government. By a decree of the Peruvian Government the exportation of the llama, alpaca, and vicuña, is prohibited.*

It is calculated that of the wool exported at this port nine-tenths are shipped to England, the remaining tenth part to Hamburg and to the United States. The cascarilla, or Peruvian bark, shipped at this port, is from Bolivia, smuggled over the frontier. It is considered to be of an excellent quality, yielding a large proportion of quinine. A small quantity of it is shipped for France, the rest to England.

In the department of Cuzco there are several gold mines, or washings, from one of which, called "Copana," a considerable quantity of gold is taken every year. Likewise a silver mine, the ore of which is considered very rich, but the works are on a very small scale. There are also several copper mines, some of which are now being worked, as an experiment, but I fear the transport of the ore will be too expensive to leave a profit.

In the department of Puno, and in the neighbourhood of the city, there a number of silver mines, most of them worked on a small scale; one of them is situated about half a league from the city of Puno, and called the "Cerro;" it is worked by a company of Peruvians. The ore extracted, which is very rich, is carried along an "adit," of more than 2,000 yards long, in some parts in boats (there being so much water), and in others, over iron rails laid down for the purpose, to the establishment of the "Manto," there to be crushed by a machine worked by steam, erected by an Englishman. This mining establishment is considered to be the best in South America, but, on account of the want of funds, and of disagreements between the members of the company, the work carried on is comparatively on a small scale.

At a distance of about fifteen leagues from the city there are other rich silver mines worked, and in the neighbourhood of them there are two establishments where the ore is ground. There are also gold washings in the department of Puno, and on the other side of the Cordillera, a gold mine of some importance is now being worked, called "Monte Bello;" a very rich vein has been discovered, out of which have been taken lumps of almost pure gold, and considerable machinery is being erected for extracting the precious metal from the ore. In the river called the "Challuhuaqueo," which runs at the foot of the mountain, considerable quantities of gold are found; there are likewise four "placers" being worked.

In the department of Arequipa the mines that were formerly worked are now neglected.

In the whole of the southern part of Peru there are mines of gold, silver, copper, and quicksilver, but most of them are neglected for want of funds to procure proper machinery to work them, and from the want of companies (the formation of which does not seem to be adapted to the characteristic disposition of these people), as also from the want of support and protection on the part of the Government to this branch of industry, which in former times was so productive.

A part of these precious metals are shipped at this port for Europe, on board the steamers, the value of which, on an average, amounts yearly to about five hundred thousand or six hundred thousand dollars, or say, one hundred thousand, or one hundred and twenty thousand pounds sterling.

* Notwithstanding it is necessary to kill the vicuña to obtain the wool, that animal not being domesticated, no diminution is perceptible in their numbers.

The exports and imports at this port during the year 1856 have differed but slightly from those of the two or three preceding years.

The exports may considerably increase, as wool, the principal article of export from this place, is in great demand, particularly the alpaca wool, the price of which keeps up in the English market, on which account that animal, the alpaca, is now much more taken care of than formerly, and consequently their numbers greatly increase.

As most of the cascarilla, or bark, exported from this port comes from Bolivia, and is smuggled over the frontier, the exportation is never very large; still it appears to be on the increase, and the quality is excellent.

The export of precious metals rather diminishes than otherwise, on account of the want of hands to work in the mines; civil dissensions, and a frightful malady that reigned in the interior for some months at the commencement of the year having made sad havoc among the Indian population.

The following is the comparison between the exports and imports of the years 1853 and 1856:—

1853	£314,140	} Exports.
1856	401,786	

Difference of 87,646 in favour of 1856.

1853	£257,732	} Imports.
1856	392,724	

Difference of 134,992 in favour of 1856.

Home Correspondence.

RAILWAY TRAVELLING.

SIR,—Mr. Baker, in his paper on this subject, assumed that constant daily railway travelling produced injurious effects on the health of railway travellers. He also suggested that the injurious effect was less in second-class carriages than in the first-class, and less in third than in second.

I will not now stop to inquire whether his view of the cause of the result he affirms be correct, but I hope you will allow me to request that our *Journal* may be used as the means through which facts on this important subject may be collected, and when collected, compared and analysed for the benefit of the public.

The first step in such an inquiry is, to collect facts, and this can only be done efficiently if a large number of railway travellers will be good enough to answer, with care, a series of questions compiled with a view to elicit information on this very interesting question.

With your permission I will submit a series of questions to the readers of the *Journal*, and if those whose experience enables them to do so, will be good enough to forward their replies to the office of the Society, addressed either to the Secretary or to me, I will undertake to publish the results in the *Journal*, as soon as my time will permit.

I am, &c.,

WILLIAM HAWES.

1. Do you travel daily, or nearly so, by railway?
2. How many miles each day?
3. State the hours of travelling and of your meals?
4. For how long a period have you been travelling regularly?
5. Which class do you travel by?
6. Have you found any inconvenience from this regular railway travelling and, if so, of what nature?
7. Do you sleep while travelling, and, if so, does sleep, in a carriage refresh you, as for instance in a chair?
8. Do you read or otherwise employ your time during your journey, or did you do so at one time, and have to give it up?

STEERING OF STEAMERS.

SIR,—I have read with much interest several letters which have appeared lately in your excellent *Journal* on the subject of the Steering of Steamers, but none of the proposed plans appear to me so simple as that which I will now describe.

The object is to turn a steamer about in either direction without using the rudder, or giving her headway, and to be able to adapt the new contrivance to vessels already in existence, such as the *Warrior* or *Great Eastern*, without much difficulty or cost.

The plan I suggest is this:—

In either end of the hold of the vessel, deep below the water line, and as far forward or aft as possible, fix a horizontal tube athwart-ships, open at each end, and passing through the ship's side, so as to communicate with the water. Next, let there be another tube fitted into the under side of the first, and passing vertically downwards through the ship's bottom into the water. Lastly, let a cylinder and piston be fitted to the middle of the first tube, so as to work in any convenient direction. The piston must be solid, and without valves, but the first tube which goes athwartships must have a valve at each end opening outwards, and capable of being fixed, when necessary, by the engineer.

Nothing more is required. The arrangement resembles a forcing pump, and it acts by drawing in water through the hole in the bottom when the piston is raised, and projecting it when the piston descends, through either side of the ship, according to which of the valves is fixed, which is determined by the direction in which she is to be turned.

The rapidity with which this contrivance would turn the ship, will depend, of course, upon the size of the tubes and cylinder, and the power of the engine.

Another plan, which is even simpler, and might be preferred, is to do without the vertical tube with the hole through the bottom, and merely use the tube which is placed athwartships. In that case the valves must be made either to open inwards or outwards, as may be required, so that when one opens outwards the other opens inwards, then, when the piston is raised the water will enter through the hole in one side of the vessel, and when it descends will be discharged through the opposite hole. Both actions of the piston will then tend to turn the ship.

This simple contrivance could be adapted to the *Great Eastern* or *Warrior* at small comparative cost, and by its means either of these vessels could be turned in her own length without the rudder. There is nothing external to the ship which could get out of order, or be carried away in action. The valves might work rather loosely in the tubes, and need not work perfectly tight, and the mode of fixing them or altering their action, as occasion may require, is already in use in various machines.

My plan is not new. There are upwards of fifty patents for a similar thing, one of the earliest of which was granted to Daniel Bernoulli, the celebrated mathematician. A similar method may be applied as a means of propulsion, and a steamer was actually built on this principle and used on the Clyde in the year 1812. How it answered I cannot say, but steam engines were not then what they are now, and it is, I think, a plan quite sound in theory, and worth trying again.

I am, &c.,

THOMAS SUTTON.

St. Brelade, Jersey, Dec. 23, 1861.

ON ATMOSPHERIC DISINFECTION.

SIR,—From time immemorial it has been a well-known practice to light large fires in marshy and other districts, in almost every quarter of the world, as it has been invariably found that this proceeding produced a very beneficial, though temporary, effect on the salubrity of these districts. This result has hitherto been attributed to the influence of the heat evolved, by which a strong current of air is induced, and, consequently, the stagnant atmosphere is set in thorough circulation.

Now, however, that the absorbent and oxidising effects of charcoal on deleterious gases and vapours are so well understood and generally admitted, I think the true cause of the beneficial action of great fires in such situations is owing to the large quantity of minutely divided charcoal, which, in the shape of smoke, is carried up into the atmosphere. These particles of charcoal absorb and destroy the deleterious gases.

Since this is the case, I think it is clear that the object in these operations ought to be to make as much smoke as possible, and that green wood, or other moist fuel, will be found the more suitable substance for this purpose.

I am, &c.,

JOHN STENHOUSE, LL.D., F.R.S.

17, Rodney-street, Pentonville, December 16th, 1861.

ELEMENTARY EXAMINATIONS.

SIR,—It is difficult to over-estimate the advantages of a uniform system of Elementary Examinations, not only as an efficient, practical stimulus to self-improvement and the continuance of the imperfect education commenced in day-schools, but as a preparation for the more advanced attainments required in the examinations of the Society of Arts. If the latter have influenced hundreds for their permanent advantage, the former will affect the welfare of thousands, and it only needs general co-operation by Local Boards throughout the kingdom to render the scheme put forward by the Central Committee a great success.

The chief duty of the Central Committee is to provide the necessary papers for Elementary Examinations in order to ensure a uniform standard, and, as a primary step in the performance of its important duties, a scheme has been issued for the year 1862*, fixing four evenings near the middle of the month of March, when the Elementary Examinations will be held in all places simultaneously. The papers will comprise two sets, the one suited for junior and the other for senior candidates.

From the diversity which almost inevitably exists in the attainments of the members of Educational Institutes, even in the mere rudiments of knowledge, a distinction has been made between junior and senior candidates in the extent of proficiency, which will entitle them to the respective certificates—the one being a stepping-stone to the other; but this is not on that account a distinction as to the age of the candidates. Experience has abundantly proved that in the same class of life the boy is often far in advance of the adult in the extent of his scholastic learning, and the examinations will, consequently, be solely a test of ability without reference to age or sex, persons of all ages and both sexes being admissible to both grades.

In any system of education it is of course impossible, as it would be dangerous, to ignore religious teaching; but as points of doctrine are fertile subjects of controversy, the examinations have been confined to a knowledge of the facts of the Gospel, and should even this be objected to or be deemed a stumbling block, the candidate has the option of selecting two subjects, of which Gospel History need not be one. It rests, therefore, with the candidate, and not with the examiners, if the result of the religious instruction, which he should have received, be not stated on the certificate.

It must be obvious, that several very important advantages will be gained by the operations of the Central Committee, if the Local Boards of Examination, by adopting the scheme, avail themselves of the opportunity afforded them. In the first place, the certificates to be granted, though awarded on the responsibility and according to the judgment of the Local Examiners, will have a national value, because they will be based upon a fixed and uniform standard of qualification. They will, therefore, pass current in all parts of the kingdom as trustworthy evidence of the abilities, attainments, and character of those who may hold them; and the young man seeking employ-

ment, for which the possession of certain qualities is indispensable, may confidently appeal to his certificate, whether granted in Leeds, in Southampton, or in Exeter.

In the second place, the Local Board will not have to experience the difficulty which, in many places, has been found almost insuperable, of having to prepare a set of questions in the several subjects of examination, and to incur the expense of printing them. All that is necessary will be to make application to the Secretary of the Central Committee at the Society of Arts, on or before the 10th of February preceding the examinations, for the requisite papers, which will be supplied at a charge of sixpence for each candidate, and to make provision that the indispensable conditions be complied with, so that the examinations may be simultaneous in every place, and no unfair advantage be taken by any premature knowledge of the examination papers.

In the third place, by commencing the stimulus of granting certificates for attainments in learning, to a class of pupils younger in age or lower in qualification, a systematic and more effectual preparation will be made of candidates for the higher standard of the Society of Arts. It is when the youth has barely mastered the mere rudiments of knowledge that there exists the least incentive to persevere. He feels all the labour and drudgery of the task before him, while he is yet unable to appreciate the future benefits, and therefore it is the more necessary that he should be induced to persevere in his exertions by the probability of success in acquiring some reward in the certificate. This would be the stamp of approval, and the proof of what he had accomplished. The majority of the youth of our working population are by their labour made in some measure independent of parental control, and as to them their growth in ignorance or in knowledge is too often a matter of choice, or rather of indifference, and their choice dependent upon the gratification of the present rather than self-improvement for the future, it is of the more consequence that some incentive should be offered to them, that they may continue by voluntary effort the imperfect education gained in the short time spent at the day school. But, familiarised with the practice of examination in the junior class, and stimulated by the certificate already gained, they will proceed more readily and boldly to prepare themselves for the senior certificates, until they feel that the higher class certificates granted by the Society of Arts are within their reach, and thus in a very few years a much larger number of candidates may reasonably be anticipated.

The Central Committee does, however, but provide the means, and thereby remove many of the difficulties which have hitherto existed. It rests with the teachers of evening classes in our Mechanics' Institutions to stimulate their pupils to increased exertions, to bring prominently and clearly before them the advantages offered, and to prepare them for success in their first essay at examination. It rests also with Local Educational Boards to make the scheme successful, by giving publicity to its details, and making every necessary provision for bringing it into efficient operation.

In places where no Local Board exists, but where candidates for examination might be found, immediate steps should be taken to form a Board in connection with the Society of Arts, and wherever practicable the Institutions in a county or district should unite to constitute a union for mutual co-operation, and material assistance might also be given by Local Boards undertaking to examine the papers and award the certificates for all the Institutes within a certain limit. This is specially needed at Birmingham, where there are several evening schools to which the system of Elementary Examinations would be beneficial, but no union exists, and the Local Board is confined to the Midland Institute.

It should ever be borne in mind that the future welfare of Great Britain, and her continued existence as a mighty nation, depends mainly, if not solely, upon the moral and mental training of her population. No acquisition of

* See vol. ix., p. 682.

foreign markets for her productions, no extent of persevering energy in her industry, will compensate for the ignorance of her people. They will prove but the efforts of brute force or misdirected skill, liable to disastrous fluctuations and ruinous reverses. The Great Exhibition of 1862 will again bring the people of this country into competition with their rivals of the world, but little need be apprehended from comparison with the artists or artisans of other climes, if the education commenced, however imperfectly, in our day schools be continued in the evening classes of our Mechanics' Institutes, and their operations be encouraged, and their results tested and rewarded, by the central system of Elementary Examinations.

I am, &c., BARNETT BLAKE.

Leeds, 16th December, 1861.

Proceedings of Institutions.

AVENHAM INSTITUTION FOR THE DIFFUSION OF KNOWLEDGE (PRESTON).—The thirty-third annual report of this Institution was adopted at the annual meeting of the members, held on the 1st of October, 1861, Mr. WILLIAM DOBSON, Vice-President, in the chair. With one exception, perhaps, the position of this Institution has undergone but little change since the date of the last annual report. The exception here alluded to will, however, be regarded as important, referring, as it does, to the improved state of the finances, a considerable reduction in the debt on the building having been effected during the year. In other respects, no decided advance can be said to have been made upon the satisfactory position held by the Institution at the beginning of the year. That position has, however, been fully maintained, notwithstanding some unfavourable circumstances with which the Institution has had to contend. For several years past it has been necessary to appropriate no inconsiderable portion of the annual income of the Institution to the payment of the charge for interest on the building fund debt. In this way the usefulness of the Institution has no doubt been much restricted. Early in the official year, therefore, the Council resolved upon measures, which they proceeded to carry out, for the entire extinction of the debt. Owing chiefly to the depression which has so unfortunately overtaken the trade of the district, these measures have not resulted in success so entire as was hoped for. The Council are, however, afforded the satisfaction of announcing that the debt has been reduced from £606 17s. 9½d., the amount owing at the beginning of the year, to £400 13s. 3½d., the present amount. The debt may be considered still further reduced by a donation of £50, kindly promised by Mr. Alderman Miller; also by donations promised by Mr. Alderman Walmsley, and other friends of the Institution. For the success hitherto attained in the liquidation of the debt, the Institution is under great obligations to his worship the Mayor, John Goodair, Esq., who, with a liberality which will be fully appreciated by the members generally, promptly responded to the appeal of the Council by a donation of £100. The Institution is also greatly indebted to Mr. Ainsworth, for his donation of £50. This donation, it will be remembered, was originally promised on condition that a sum equal to the remaining portion of the debt should be obtained from other sources. Seeing, however, that the Council could not with propriety prosecute their appeals, in the present state of the town, and that the possibility of fulfilling the condition was thus indefinitely postponed, Mr. Ainsworth at once paid over his donation, with the considerate regard for the interests of the Institution which he has shown in so many former instances. The number of subscriptions received during the year is 533, being 29 less than were received the year previous. The report states that this slight falling off is attributable to the extreme severity of the weather in the months of December and January last. Usually a large increase in the number of subscribers takes

place about Christmas. Last year, however, a considerable decrease took place at that time, the severe weather having no doubt kept at home many persons who would otherwise have spent their evenings at the Institution. The weather, severe as it was, had, however, but little effect upon the evening classes, the attendance upon which has been on the whole fully maintained. The Council remark that the means at their disposal still remain very inadequate to the requirements of the classes, the usefulness of which is, for this reason, much circumscribed. Even in their present condition, however, the classes are doing useful work, quietly and unostentatiously, but not, therefore, the less effectively; there are not wanting instances of students to whom the instruction afforded in the classes is known to have formed the stepping-stone to immediate advancement in life. The undermentioned students having successfully passed the Examination of the Association of Mechanics' Institutions of Lancashire and Cheshire, have had awarded to them Certificates of Merit, as follows:—Alice H. Watson, first-class certificate; Alice Smith, second-class certificate; Matthew Harrison (Algebra), second-class certificate; Benjamin Mattinson (Mensuration), second-class certificate; Joseph Foster (Arithmetic and Composition), third-class certificate; Benjamin Foster (Geometry), third-class certificate; and William Yates (Composition), third-class certificate. Two series of lectures were delivered during the last season, as follows:—(Tuesday Evening Series) Rev. Canon Parr, "Capital and Labour;" Dr. Witherington, "Curiosities of Insect Structure;" Mr. James Marshall, "Our Mother Tongue;" Rev. St. Vincent Beechey, "The Ancient History of Egypt, in connection with the Bible (two lectures);" Mr. May, "An Hour with Goldsmith;" Preston Elocutionary Association, Elocutionary Entertainment; Dr. D. J. McGowan, "On Japan (two lectures);" (Saturday Evening Series) Mr. J. J. Myers, "Electricity;" Rev. E. D. Rendell, "Chemistry of the Atmosphere;" Mr. W. Dobson, "Incidents illustrative of the Manners and Customs of Preston in the Olden Time;" Mr. F. Cotman, "Life and Times of Alfred the Great;" and Mr. C. Hardwick, "Poetic Elocution; or, the Art of Reciting Poetry in Public." The Tuesday Evening Series proved on the whole eminently successful; the subjects having been well chosen, and treated in a style at once able and popular; while the attendance, in nearly every instance, was large and respectable. The Saturday evening series were entered upon with the view of providing, for the operative classes especially, means of relaxation at once instructive and amusing; and thus affording to the working man the opportunity of passing the Saturday evening at least harmlessly, if not usefully. So far as the series extended, it may be said to have been as successful as could have been looked for. The lectures were, in every instance, delivered gratuitously, and, though not attended by numerous audiences, were listened to throughout with marked interest. The partial success attending them may, therefore, well justify the repetition of a Saturday evening series next season. The lectures, although in other respects successful, resulted in a pecuniary loss. In the last Annual Report it was stated that the site of the Institution had been enlarged, by the purchase of an adjoining plot of land. This purchase the Council deemed it advisable to abandon. To proceed with the purchase would render necessary a considerable outlay, and would also entail a considerable present annual charge for ground-rent upon the Institution; and as this could be ill afforded in the present state of the finances, the Council have deemed it well to defer to a more favourable opportunity any further negotiations for the land in question. The annual *soirée* of the Institution took place on the 19th December, 1860, in the Exchange-rooms, and was attended with the usual success—the funds of the Institution being benefited by it to the amount of £13 0s. 9d. A further addition of £1 2s. 3d. resulted to the funds from a *soirée* of the Class students, held in the Institution in November last. The

following table shows the number of volumes in the library, and the issue during the past twelve months:—

	No. of Vols. in Library.	No. Issued.	No. Added.
Arts and Sciences	1,393	1,640	25
History	669	749	10
Voyages and Travels	580	1,180	11
Biography	620	1,106	29
Poetry and Drama	312	577	3
Novels and Tales	574	7,542	43
Miscellaneous Literature, in- cluding Magazines, &c.,	2,468	2,279	109
Total.....	6,566	15,073	230

At the Penny Bank, the accounts opened October 2nd, 1860, were 3,029; September 3rd, 1861, 3,427. Amount due on depositors' account October 2nd, 1860, £620 19s. 7d.; September 3rd, 1861, £533 14s. 4d.

MEETINGS FOR THE ENSUING WEEK.

MON.....	Actuaries, 7,
TUES....	Royal Inst., 3. Professor Tyndall, "On Light" (Juvenile Lectures).
WED....	Pharmaceutical, 8,
THURS....	Royal Inst. 3. Professor Tyndall, "On Light" (Juvenile Lectures).
FRI.....	Archæological, 4,
	Royal Inst., 3. Professor Tyndall, "On Light" (Juvenile Lectures).
SAT.....	R. Inst., 3. Professor Tyndall, "On Light" (Juvenile Lectures).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, December 20th, 1861.]

- Dated 10th August, 1861.
1993. A. S. Stocker and A. R. Stocker, Wolverhampton—Imp. in the manufacture of horse shoes, boot heels, wheel tyres, rails, and safes.
- Dated 30th August, 1861.
2166. J. Bishop, 1A, Gloucester-street, Camden-town—Imp. in the manufacture or weaving of velvet or pile fabrics made entirely or partially of silk, and in looms used for that purpose.
- Dated 13th September, 1861.
2220. T. L. Murray, Paris—Improved applications of mica previously coloured or metallized for letters and signs, decorating churches, rooms, shops, frames, and other ornamental and useful purposes. (A com.)
- Dated 5th October, 1861.
2495. W. Clark, 53, Chancery-lane—An improved gas regulator and purifier. (A com.)
- Dated 26th October, 1861.
2682. F. Barnett, 60, St. Mary Axe—Improved electric danger signals for railways and other cognate purposes.
- Dated 1st November, 1861.
746. A. Smith, Mauchline, Ayr, N.B.—Imp. in producing or delineating ornamental lines and figures on metal and other surfaces.
- Dated 9th November, 1861.
2825. T. O'Reilly, Shaw-street, Dublin—A new or improved table or apparatus for tailors to work at without sitting.
- Dated 13th November, 1861.
2859. F. Coney, Waterloo-road—An improved stock for brooms.
- Dated 16th November, 1861.
2889. W. Naish, Wilton, Wiltshire—Imp. in the manufacture of saddlecloths, known as "numnahs."
- Dated 19th November, 1861.
2909. J. Schloss, Cannon-street West—Imp. in pouches.
- Dated 20th November, 1861.
2913. E. F. Smith and T. Swinnerton, Dudley—Imp. in the manufacture of coke, and in apparatus connected therewith.
- Dated 22nd November, 1861.
2933. R. De Clercq and E. Chazelles, Brussels—Imp. in apparatus for raising and supplying water to boilers, and for other purposes.
- Dated 25th November, 1861.
2953. J. Macintosh, North Bank, Regent's-park—Imp. in obtaining and applying motive steam and liquid power, and in apparatus connected therewith.
2955. J. Ronald, Liverpool—Imp. in machinery used for spinning hemp, flax, manilla, wool, and like fibrous material, and for the manufacture of "topped-up," "formed," or "laid" thread, twine, cord, line, cable, and other cordage.

Dated 26th November, 1861.

2976. J. H. Johnson, 47, Lincoln's-inn fields—A new or improved apparatus for supporting the womb in cases of prolapsus uteri. (A com.)

Dated 28th November, 1861.

2999. C. Stevens, 31, Charing-cross—Imp. in furnaces for working iron ore. (A com.)
3000. J. M. Rowan, Glasgow—Imp. in the manufacture of railway wheels, and in apparatus to be used therein.

Dated 29th November, 1861.

3003. L. H. C. J. Carle, Brownlow-street, Holborn—Imp. in means or apparatus for indicating and registering the "score" for billiards and other games.

Dated 5th December, 1861.

3048. J. Knowelden, Southwark—Imp. in pumps.
3052. J. Cochrane, Harburn, Mid Lothian—Imp. in wet gas meters.
3054. C. Davis, Bancroft-place, Mile-end—An improved composition for coating metal and wood to preserve them from decay, applicable as a substitute for copper and other sheathing or other compositions now in use for coating ships bottoms to protect them from the injurious action of water.

Dated 6th November, 1861.

3058. J. Bailey and W. H. Bailey, Salford—Imp. in apparatus for indicating the pressure of steam and gases, the amount of vacuum, the flow of fluids, the weight of materials, and the speed of bodies either revolving or traversing, and also the employment of aluminium or its alloys in the manufacture of the same.
3060. J. D. Napier, Glasgow—Imp. in brakes. (A com.)
3064. J. Howard, Bedford—An imp. in the construction of haymaking machines.
3066. J. J. Russell and B. J. Brown, Wednesbury—Imp. in apparatus used in the manufacture of paper tubes.

Dated 7th December, 1861.

3670. G. T. Bladen, Grove-lane, Camberwell—Imp. in chimney tops for the prevention of down draughts in chimnies.
3072. Major-General W. N. Hutchinson, Devonport—Imp. in projectiles and ordnance, and in apparatus to be used therewith.
3074. T. Fearn and T. Cox, jun., Birmingham—The application of certain electro deposits to the coating or finishing of the stretchers, ribs, and other metal portions of umbrellas and parasols.

Dated 9th December, 1861.

3082. J. Fordred, Brighton—Imp. in treating linseed oil.
3086. W. Mason, 40, Canton-street, Poplar—Imp. in applying armour or thick plating to ships and other structures.
3088. S. Newton, 17, Nutford-place, Edgeware-road—Imp. in apparatus for steering and stopping vessels.

Dated 10th December, 1861.

3090. H. Alexander, Glasgow—Imp. in turning apparatus for making gas burners.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

3101. M. A. F. Mennons, 39, Rue de l'Échiquier, Paris—Imp. in jack machinery for moving heavy bodies. (A com.)—11th December, 1861.
3112. M. A. F. Mennons, Fournival's-inn—An improved means of defecating and purifying cane and other saccharine juices. (A com.)—12th December, 1861.

PATENTS SEALED.

[From Gazette, December 20th, 1861.]

December 20th.	1643. W. McNaught.
1613. E. Dance.	1645. H. Hamer.
1615. J. Ferrabee.	1646. J. C. Smart & A. Aitchison.
1616. R. Howson.	1654. H. J. Rouse.
1634. J. R. Tussaud and F. C. Tussaud.	1666. W. Clark.
1637. J. Higgins and T. S. Whitworth.	1714. L. Roughton.
	2202. L. R. Bodmer.
	2482. T. G. Ghislin.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, December 20th, 1861.]

December 16th.	December 17th.
2896. J. Kerr.	2900. J. Mackenzie.
3007. J. H. Johnson.	

[From Gazette, December 24th, 1861.]

December 19th.	2964. R. Hornsby.
294. D. Edleston.	2978. H. Hutchinson.
December 20th.	December 21st.
295. T. Steven and T. Scott,	2924. M. Kenney.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, December 24th, 1861.]

December 19th.	December 20th.
2684. W. Milner.	2692. W. Bertram.
	2742. G. J. Benson.

Journal of the Society of Arts.

FRIDAY, JANUARY 3, 1862.

INTERNATIONAL EXHIBITION OF
1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £442,950, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

Every credit is due to Messrs. Kelk and Lucas, who are doing their work with a rapidity which English energy and English capital alone could ensure; and, with all this haste of execution, one can detect no want of solidity in workmanship, or accuracy in finish. Although the task they have undertaken is at least three times as great as that in 1851, there is now no doubt at all that the building will be in a much more advanced state for the reception of goods at a corresponding date than in the former International Exhibition. To show how far the division of labour is carried in a work of such magnitude, it may be stated, that during the past week above 2,600 men were employed in different parts of the building.

The best spot for judging of the progress of the works in their present condition is the garden of the Royal Horticultural Society, and from here it may be seen how rapid a progress is being made from day to day. The contractors and the Thames Iron Company are competitors in the erection of the two domes, and the time-race between them begins to be quite exciting. It will be remembered that Mr. Kelk took the western dome in hand six weeks after the eastern one was begun, and, profiting by the experience gained, his deputy, Mr. Ashton, has adopted a different mode of construction, together with a greater distribution of detail, and has already advanced so far that there is every probability of the two domes being completed nearly at the same time.

In the eastern dome, six out of the twelve ribs are completed, and are tied together by jointings at the top, which jointings form a small duodecagonal ring. When the whole is finished, this ring will be the base of a small room about thirteen feet square, and it has been suggested that it will be admirably adapted for the observation of

meteorological phenomena. The other six ribs only want the top joints.

In the western dome all the ribs are rising at the same time from their starting, and the ring for the summit is already at the top of the scaffold and awaiting the completion of the ribs. It will thus be seen that, comparatively speaking, this dome is further advanced than its fellow.

The southern courts may now be pronounced to be completed, with the exception of painting and decoration. The northern courts are also progressing. The upper story of the refreshment courts above the arcades of the Horticultural Gardens, are being pushed forward very quickly, so much so that already the principals of the roof at the eastern end are fixed. The English contractors for refreshments intend constructing ample cellarage beneath the eastern arcades, in which, during the Exhibition, they will store the best sorts of British beer.

Considerable progress may be discerned in the eastern annexe. The ground is being levelled, and a large portion of the arcades is completed. It is not yet decided whether or not there shall be, at the end of the annexe, a third class refreshment room.

The roof over the grand staircase is fixed, and ready for the glaziers. The beams of the smaller staircases, in the centre of the building, are in their places, and preparations are being made to lay down the stairs themselves, so that, before long, visitors will have free access to the galleries.

Her Majesty's Commissioners and the Council of the Royal Horticultural Society have entered into arrangements, by which it is agreed that the price of a season ticket of free admission to both the Horticultural Gardens and the Exhibition, shall be five guineas.

Her Majesty's Commissioners are still engaged in receiving notices of acceptance by British Exhibitors of the space allotted to them. Against such allotments, it is understood that 2,500 appeals have been lodged, a number about 250 times as great as that in the Exhibition of 1851. Arrangements are also being made to secure for exhibition, in the nave and transepts, trophies of the productions of the most eminent British manufacturers.

THE MACHINERY DEPARTMENT OF THE
EXHIBITION OF 1862.

CLASSES 5, 7, 8, AND 10.

No. I.

The business of the machinery department, in classes 5, 7, 8, and 10, is, perhaps, the most onerous of all the business of the classes into which the industrial products are to be distributed for Exhibition.

The supply of steam to work the numerous machines which are to be in motion, is to be furnished from a number of large double-flue boilers, 30 feet in length, of 50 nominal horse power each, to be supplied by Messrs. Hick

and Sons, of Bolton, sufficiently powerful to work the whole of the machinery in motion at once, without any necessity for stopping any portion of it, or of working parts of the machinery alternately. The disadvantage of an under-supply of steam in former exhibitions was strongly felt, and it has been the aim of Her Majesty's Commissioners, in this particular, to have an ample supply of steam for every demand, without restriction. The steam from the boilers, which is to be of 70 lbs. pressure per square inch, will be conveyed through large pipes down the passages of the western annex, which is to contain all the machinery in motion; the extent of steam pipe will be unprecedented in engineering practice. The annex is nearly 1,000 feet in length from north to south, and the boiler-house will be built at a distance of at least 100 feet from the north end, near the Kensington-road. There will be two lengths of pipe about 900 feet each, and a third and shorter length, which, with the junctions required, will amount to a total length of upwards of 2,500 feet, for the ramification of steam pressure throughout the annex. It is not intended by Her Majesty's Commissioners to erect steam engines specially for the services, but to make free use of the numerous and various steam engines which will be exhibited, the intending exhibitors of which generally are desirous to have them put in motion. The steam pipe will be provided with expansion-boxes at frequent intervals, to take up the unavoidable expansion and contraction of metal pipes subjected to heat and cold alternately, and they will be thickly clothed in felt, and bedded in ashes, sand, or other non-conducting substance, so as to prevent loss of heat by radiation and condensation of steam within the pipe. Such a provision, though essential and highly important, is by no means so difficult to mature as appears to have been assumed by certain writers for the press; indeed, the proportion of steam lost by condensation may be reduced to a very small fraction, by the expedient of superheating it before it leaves the boiler-house, and drain-cisterns will be provided at suitable spots for the reception and collection of the water precipitating within the pipes.

The exhaust steam, discharged from the numerous steam engines at work in the annex, will be intercepted by large return exhaust pipes, laid parallel to the steam pipes, and conducted back to the shaft or chimney attached to the boiler-house, into which it will be discharged. Thus, the whole operation of the steam, conducted to the steam engines and back again, will be conducted without noise or nuisance; and the spectacle which would otherwise be presented of numberless clouds of spent steam escaping from the various engines through the roof of the annex, according to the usual routine of workshops, will be wholly prevented. The exhaust pipe, like the steam pipe, will be fitted with expansion-joints and drain-cisterns.

The gross area of the western annex is little more than four acres, or about 180,000 square feet; of this area 16,000 square feet are to be set apart for branch refreshment rooms, about 70,000 square feet for the exhibition of foreign machinery, and about 90,000 square feet for the machinery of the United Kingdom. An additional area of 20,000 square feet will probably be reserved in the eastern annex for the exhibition of machinery.

HARDWARE IN THE EXHIBITION OF 1862.

The *Ironmonger* says:—

Exhibitors in the hardware centres are now manifesting considerable interest in the Exhibition of 1862, and great activity is being displayed in preparing specimens. Much disappointment prevails in consequence of the cutting down of the space asked for by the various local committees. On every hand there are murmurs and expostulations; and, notwithstanding the clever device of asking for more space than was really required, under the impression that more would be got than if just the necessary quantity required had been asked for, and also applying through the Royal

Commissioners instead of through the local committee, the result is the same. Only a given space was at the disposal of the Commissioners, and it could not be extended. The only question which, therefore, does arise is simply, have the Commissioners recognised fairly and truly the various important seats of manufactures; and have they apportioned the limited space at their command in proportion to the wants and requirements of each locality?

The various districts engaged in the production of articles in iron and general hardware, embraced in Articles 31 and 32, are loud in their complaints. Sheffield feels in such a fix that it has appointed six local commissioners to apportion out the space, in order to get rid of the difficulty, which is considered to be so great that "it would require almost miraculous powers so to arrange it as to meet the wants of the large number of intending exhibitors. The number of applicants for space in classes 31 and 32 (iron and general hardware, steel and cutlery) was 103, and the space applied for 14,591 feet, whereas the extent of floor space for distribution among them was only 2,000 feet, or scarcely one-eighth of what was required. The number of applicants in other classes was 23, and the space applied for 883 feet, and for them there were 410 feet, or nearly 50 per cent. The total number of applications for space, therefore, was 126, and the amount of space required 15,474 feet, whereas the amount of space allotted was 2,410 feet of floor space, and the same space vertically.

In 1851, Sheffield asked for 9,673 feet floor, and 3,518 of wall space, to accommodate 298 intending exhibitors. It eventually got 3,736 floor, and upwards of 2,900 wall, but the number of exhibitors was reduced to 146, or 26 in excess of the number of present applicants.

In Wolverhampton, on the occasion of the Exhibition of 1851, 40 exhibitors asked for 1,982 feet of floor and 506 feet of wall space. Finally 44 exhibitors secured 603 feet of floor and 1,850 feet of wall space. On the present occasion, 36 exhibitors ask for 3,000 feet of floor, and get 1,000 feet, or one-third. In the case of Wolverhampton, however, the difficulty will not be so great as it seems, inasmuch as one applicant who will not, it is expected, show, and whose "inventions" do not come under the denomination of hardwares, asks for an extent which is an unduly large portion of the total space; and inasmuch also as an exhibitor of hurdles, and the like, asks for another large portion. In the latter case little difficulty would be experienced in so arranging the applicant's wares, as that he may obtain all the space he needs, and yet the convenience of some other exhibitors rather facilitated than impeded.

Birmingham, in 1851, for 291 intending exhibitors, applied for 15,895 feet floor, and 6,267 feet wall space, and got about half that asked for, or 7,383 feet of floor and 8,737 feet of wall space for 258 exhibitors. For the next Exhibition there is an increase of applicants for space, or 310 exhibitors, 85 of whom have been taken to be dealt with by the metropolitan committees. To the 225 applicants, who claim 19,330 feet of floor, and 7,271 feet of wall space, equal to 26,601 feet, the Commissioners have granted 5,572 feet of floor, and the same amount of wall space, in all, equal to 11,144 feet.

It is said, on the authority of the Royal Commissioners, that the total demand for floor space is seven times the quantity of that available. That being the case, the awards of space of floor do not appear liable to dispute, and, admitting that the duties are arduous which the local committees have had to perform, their hands have been strengthened by a most judicious letter which has been issued by the Royal Commissioners, and which is full of information, alike to local committees and exhibitors. In that letter, exhibitors are encouraged to endeavour to pile their goods, in the official words, by the "construction of screens or vertical cases, rising above the counters, or objects arranged on the floor. These screens, throughout the building, may be at least 12 feet high, and in some cases 25 feet, or even higher." Very few general hardwares, however, can be so treated, and the exhibiting of them prove of advantage to the exhibitor. "For articles

which will be suspended over head (not on walls) there is, practically, an unlimited space at the disposal of the Commissioners. Of this mode of exhibition, too, hardware manufacturers will, generally, be unable to avail themselves.

The six commissioners in Sheffield, and the local committees in Birmingham, has been busy in doing the best they could to meet the fair requests of all, and in particular negotiating with large applicants, in order to induce them to help others who really need all the space they have asked for, and whose representations will be really insufficient without it. All are seemingly uniting to render the representation of the manufactures of their respective towns and districts worthy of the positions which they so earnestly worked for, and successfully achieved in the Great Exhibition of 1851.

Steps are being taken in Wolverhampton which are likely to revive the great lock controversy of ten years ago. There is now in course of manufacture in that town a new patent keyless lock, having 244,140,125 combinations, to open all of which would take a man—supposing he could live so long—some 130 years! This extraordinary lock, which is based upon the permutation principle, is the invention of Viscount de Kersolun, of Paris, and by him communicated to Mr. Edward Loysel, of Cannon-street, London, who is better known as the patentee of the coffee percolator. Although it is termed a keyless lock, it has as many keys as there are combinations, the back parts being the locks and the front parts the keys, which cannot be removed. Every change made in the concentric rings answers the same purpose as the keys, so that a lock which has seven permutations, or 5,040 combinations, has 5,040 keys, and so it is termed a keyless lock, with 5,040 or any number of keys. The specimen has six concentric cylinders, upon the projecting or outer edges of which are twenty-five of the twenty-six letters of the alphabet, and it is only when these letters are brought into a certain predetermined arrangement that the other parts of the lock can be so worked as to admit of the bolt being drawn for the purpose of shutting or opening the article to which the lock is applied. It is absolutely necessary, as in the old letter padlock, to know the proper arrangement or combination of letters before the lock can be opened. In order to prevent the particular combination of letters from being discovered by feeling the parts, as is sometimes the case, the inner edges of the moveable concentric cylinders are toothed or serrated, so as to deceive any person who may attempt to tamper with the lock. In the event of the particular combination of letters not being discovered by the person desirous of opening the lock, the exhausting of all the variations which are in that case necessary to the success of the operation would entail an expenditure of the time we have mentioned, supposing the operator to make ten changes a minute, and to manipulate ten hours on every working day. It is intended to place these locks on some iron safes that are also being made in Wolverhampton for exhibition at the forthcoming "World's Fair." In one of the safes it is proposed to place the sum of £500, which is to fall to the lot of the person who may be fortunate enough to effect an opening into the safe. The production of the lock for the market is in the hands of Mr. Aubin, the inventor of the "Trophy lock of ingenuity," which was exhibited in the Hyde-park Palace, and subsequently purchased by Mr. Hobbs. Mr. Aubin, then a working locksmith, is now the proprietor of works in Wolverhampton, where he employs machinery invented by himself, and of equal delicacy with that displayed in the model which made his name celebrated. His ingenuity is being further displayed in the designing and constructing of machinery adapted to the manufacture just described. Mr. Aubin's practical experience also is being brought to bear in making such improvements upon the Count's lock as are required to increase the probability of its success in a financial aspect. The principle of the lock may be applied to every variety of this description of fastening, and when used upon a travelling-bag is a vast

improvement upon locks that require keys to open them, and is at the same time a great ornament.

THE EXHIBITION OF 1862 AND THE WORKING CLASSES.

A club has been formed at Sudbury, to enable the working population of that town to visit the Great International Exhibition of 1862. The club will receive deposits at the rate of not less than 3d. per week for a single ticket, and children under 12 years of age 2d. per week; and it is expected that not only will considerable resources be thus collected, but that great advantages will also be derived in regard to railway fares and accommodation in town from the principle of organisation. The mayor (Mr. S. Higgs) has offered 1s. each to the first 200 *bonâ fide* working men who subscribe. A similar club has been formed at Stowmarket and one or two other points in the eastern counties.

INTERNATIONAL CATTLE SHOW, 1862.

The Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland have jointly arranged to conduct an International Cattle Show in London next summer, and Battersea-park has been granted for the purpose, where the necessary enclosure and buildings will be made. The show will take place during the week commencing the 23rd of June, 1862. The prizes by the Royal Agricultural Society are offered in the following classes, and consist of money and medals:—

CATTLE.—Short-horned, Hereford, Devon (a gold medal will be given to the owners of the best male and the best female animals in the foregoing classes), Sussex, Long-horned, Norfolk and Suffolk polled, North Wales, South Wales, Irish—Kerry), Channel Islands—Jersey, commonly called Alderney, Guernsey.

HORSES.—Thoroughbred stud-horse, hunter, carriage, roadster.

AGRICULTURAL HORSES.—Suffolk, agricultural not qualified to compete as Suffolk, dray, ponies above 12½ and under 14 hands, and not exceeding 12½ hands.

SHEEP.—Leicester (a gold medal will be given to the owner of the best ram of any age in the class), Lincoln, Cotswold, Kentish or Romney Marsh, long-woolled (not qualified to compete as Leicesters, Lincolns, Cotswolds, or Kentish), Irish (pure native long-woolled breeds), South-down (a gold medal will be given to the owner of the best ram of any age in the class), Shropshire, Hampshire and West-country-down, Oxfordshire-down, Dorset, mountain.

Pigs.

The prizes by the Highland and Agricultural Society of Scotland are offered in the following classes, and consist of money and silver medals:—

CATTLE.—Polled (Aberdeen and Angus), polled (Galloway), Highland, Ayrshire.

HORSES.—Clydesdale.

SHEEP.—Black-faced, Cheviot.

Members of the Royal Agricultural Society of England, and of the Highland and Agricultural Society of Scotland, have the privilege of making entries, on the payment of 5s. on each certificate of cattle, horses, sheep, and pigs; but non-members will be allowed to compete on the payment of 15s. on each certificate.

Forms of certificate may be obtained on application to the Secretary, at the office of the Society, No. 12, Hanover-square, London, W. All certificates for the entry of live-stock must be returned, filled up, to the Secretary, on or before the 1st of May, and the Council have ordered that all certificates for live-stock received after the 1st of May shall not be accepted, but returned to the persons sending them.

All prizes of the Royal Agricultural Society of England, and all the prizes offered by the Highland and Agricultural Society of Scotland, are open to general competition.

As the object in giving prizes for neat cattle, sheep, and pigs, is to promote improvement in breeding stock, the judges, in making their awards, will be instructed not to take into their consideration the present value to the butcher of animals exhibited, but to decide according to the relative merits for the purpose of breeding. If, in the opinion of the judges, there should be equality of merit, they will be instructed to make a special report to the Council, who will decide on the award. The judges will be instructed to withhold any prize if they are of opinion that there is not sufficient merit in any of the stock exhibited for such prize to justify an award; should, however, the question of disqualifying a whole class arise, the judge shall consult with the Stewards of the yard, and their joint decision shall be final.

The judges will be instructed to give in a "reserved number" in each class of live-stock; viz., which animal would, in their opinion, possess sufficient merit for the prize in case the animal to which the prize is awarded should subsequently become disqualified. In the classes for stallions, mares, and fillies, the judges, in awarding the prizes, will be instructed, in addition to symmetry, to take activity and strength into their consideration. The judges will be instructed to deliver to the Director their award, signed, and stating the numbers to which the prizes are adjudged before they leave the yard. The necessary printed forms of certificates may be obtained from the Secretary, by persons desirous of exhibiting live-stock; who are requested to state the distinctive reference number assigned to each class in the above general list, and also to state how many forms of certificates they desire to have sent to them. The Secretary will acknowledge, by return of post, the due receipt of all certificates received by him one week or more before the 1st of May, and the receipt of all others as soon afterwards as the pressure of business at that time will permit. The name and residence of the breeder of each animal entered for exhibition should be stated when known: or, when not known, circumstantial information given respecting the cause of failure in that item of the certificate. The age of each animal, calculated up to the 1st of July inclusively, must be stated in the certificate. In all cases the age of the animal is to be computed from the day of its birth, excepting in the case of horses, when the year only will be required. The same animal cannot be entered in two classes, either for the prizes of the Royal Agricultural Society of England, or of the Highland and Agricultural Society of Scotland; nor can any animal entered for competition in either of those two divisions be allowed to compete in any other division. In every certificate of live-stock, the exhibitor will be required to sign an engagement to forfeit and pay to the society the sum of £20, if the animal, or any of the animals (as the case may be) which he exhibits are, to his knowledge, suffering under any contagious or infectious disease.

No stock whatever will be admitted into the yard for exhibition unless the necessary certificate has been sent to the Secretary by the proper time. All stock entered for exhibition may be brought to the show-yard between the hours of eight in the morning and six in the afternoon of Monday, the 23rd of June, and must all be in the yard by 4 p.m. on Tuesday, the 24th of June; none will be admitted after the latter hour.

All stock must remain in the show-yard until after six o'clock in the afternoon of Wednesday, the 2nd of July, and as much longer as the Director may consider it necessary. No horse will be allowed to leave the show-yard during the whole period that the exhibition lasts. The Society will not, in any case, or under any circumstances, hold itself responsible for any loss, damage, or mis-delivery of live-stock or other articles exhibited at the Society's show. No animal which has won a first prize in any class, at a previous meeting of the Society, will be allowed to compete for a similar prize at the meeting in London. No animal that has been exhibited at a fat stock show shall compete for the prizes of the Society. Any prize may be with-

held when the judges are of opinion that there is not sufficient merit in the stock exhibited for such prize to justify an award. No animal can be removed from its place without being subject to a fine of £1, nor can it be taken out of the show-yard, without leave in writing from the Director or the Stewards of the cattle yard. Exhibitors will be charged £1 for each cow sent into the yard to supply milk for animals exhibited. In order to prevent the non-exhibition of animals which have been entered for the show, thus causing unnecessary preparations, expense, and the disarrangement of the show-yard, a fine of 10s. will be levied for each entry of stock not exhibited, unless a certificate under the hand of the exhibitor, or his authorised agent, be lodged with the Secretary of the Society, at least fourteen days before the day of exhibition, certifying that such non-exhibition is caused either by:—1. The death of the animal or animals; or 2. Contagious or infectious disease (confirmed by the explanatory certificate of a veterinary surgeon). All persons who shall neglect to pay in due course the stated fines incurred for non-exhibition, shall be debarred from exhibiting at the future country meetings of the Society.

The stewards will be instructed to endeavour, if possible, to decide all protests that may be made against the awards of the judges at the metropolitan show, before the conclusion of the meeting; such protests must be delivered to the Stewards, at the Director's office, in the show-yard, before six o'clock on the Wednesday evening of the show week; and no protests will be subsequently received unless satisfactory reasons be assigned for the delay.

Foreigners are invited to compete, and the Royal Agricultural Society of England offer prizes for male and female breeding stocks in each of the following classes, and those consist of a gold, silver, and bronze medal in each class:—

CATTLE.—Charolaise, Garonnaise, Norman, De Salers, Pyrenean, Breton, other French breeds, Flemish, Dutch, Swiss, Spanish, other Foreign breeds, Indian or other native Colonial breeds.

In addition to the above prizes, six grand gold medals of honour will be distributed among the above classes, at the discretion of the stewards and judges.

HORSES.—Horses for heavy draught, of any pure foreign breed; agricultural horses, used for agricultural purposes generally.

In addition to the above prizes, two grand gold medals of honour will be distributed among the above classes, at the discretion of the stewards and judges.

SHEEP.—French merino, Spanish merino, Saxon merino, other pure merino, long-woolled foreign breeds, short-woolled foreign breeds (not qualified for the above classes), cross-bred merino, other mixed breeds.

In addition to the above prizes, two grand gold medals of honour will be distributed among the above classes, at the discretion of the stewards and judges.

PIGS.—Pure foreign breeds.

The prizes offered by the Royal Agricultural Society of England amount to £3,690, of which £800 is offered in medals to be competed for by foreigners. The Highland Society offers £735 in money and £250 in medals. No prizes are offered for implements, as that would be in some degree trenching on the Great Exhibition, where the best implements will be distinguished by medals.

The last day of entry is the 31st of March, 1862. The necessary printed forms of certificate and specification may be obtained from the Secretary, at No. 12, Hanover-square, London, W., by persons who are desirous of exhibiting implements, &c., and no other implements, &c., will be admitted for exhibition unless the necessary certificate, filled in on the printed form prescribed, complete, and signed by the exhibitor (or his agent) in the manner directed, has been delivered to the Secretary, or sent (postage free) directed to him, so as to reach No. 12, Hanover-square, on or before the 31st of March, 1862. The specifications, and any additional particulars of such implements, must be delivered on the 31st of March; but if such speci-

fications and necessary particulars required by the printed rules be neglected to be sent by that time, such implement, &c., as that informality affects will be disqualified for exhibition. The certificate must state the space each exhibitor wishes to occupy (the sheds being 20 feet wide), in order that the space may be apportioned among the various parties who make application. Exhibitors of implements, &c., will have to pay 2s. per foot run towards defraying the expense of erecting such quantity of shedding as the committee may allot, and 1s. per foot frontage in the machinery-in-motion yard; which amount must be remitted to the secretary on or before the 15th of April, 1862. Non-members wishing to exhibit implements, &c., are required to pay 5s. as an entrance fee to the Society. This amount (in addition to 2s. per foot run of shedding required) must be sent to the secretary, on or before the 15th of April; otherwise the entry will become void. A description of each article intended to be shown must be written on one side only of the specification form. It must detail the name and address (when they are known) of the inventor, the improver, and the manufacturer; it must also state the improvements (if any), peculiarities, &c., of each implement. The specification must state the lowest selling price of each article complete, and in good working order, and each exhibitor will be bound to execute all orders given to him in the show yard at the price stated in his specification, on pain, in case of failure of such engagement, of not being again allowed to exhibit at the meetings of the Society. If a prize or medal was awarded at a previous meeting of the Society, to any implement which is entered for exhibition at the metropolitan meeting, the specification must state whether it was a prize or medal, or both, and the date at which it was awarded; if a prize, the amount must be stated; but this must be confined to the prizes or medals of the Royal Agricultural Society of England alone. If any improvement has been made in the implement subsequently to that award, a description and drawing of the improvement must be furnished, if required. Exhibitors, in sending in the specifications of their different articles for publication in the catalogue, must confine themselves to stating, within the space of six lines of printed catalogue matter, such particulars only as are required by the regulations of the prize sheet, as the insertion of additional particulars beyond those six lines up to twelve (the utmost allowed) must be paid for by the exhibitors at the rate of two shillings a line, with a view to prevent any unnecessary enlargement of the catalogue. In order to prevent the non-exhibition of implements which have been entered for the show, thus causing unnecessary preparations, expense, and the disarrangement of the show-yard, a fine of 5s. on implements under £10 in value, and a fine of 10s. on implements of £10 and upwards in value, will be levied on each implement which shall not be exhibited, unless a certificate, under the hand of the exhibitor, or his agent, shall be lodged with the Secretary of the Society on or before the day of exhibition, detailing the causes of prevention. All machinery, implements, &c., intended for exhibition, must be brought to the show-yard, and be arranged in complete order, before five o'clock in the evening of Saturday, the 21st of June. No implement having upon it paint or varnish in a wet state will be allowed to enter the yard. If any exhibitor shall send machinery away from home so that it is not possible for it to arrive in time to be admitted into the yard, he shall forfeit the right to the reduced rate of railway transit. Exhibitors must apply at the Hon. Director's office, in the show, for the number tickets corresponding with the Society's Catalogue; and these tickets must be affixed to the respective articles by five o'clock in the evening. Locomotive and traction engines will not be allowed to move about any portion of the yard, except such as the stewards may select, under their written authority. All implements must be unpacked and arranged in each stand by the exhibitor, according to their numbers, and in the same direction as the numbers of the different

stands run, consecutively. No implements can be removed from the yard until six o'clock in the evening of the last day of the show. No fire will be allowed to be lighted in the body of the show yard for any implement. No exhibitor may light a fire under, or supply the boiler of his steam engine, until he has the authority of the Hon. Director, or Stewards, to do so; this authority will be given after an engineer, appointed by the Society, has examined the engine, and has certified that the engine is perfectly safe under a working pressure of 45 lbs. per square inch, and that the engine is supplied with the necessary gauges for showing the pressure of steam and quantity of water in the boiler. No engine which is used for the exhibitor's own purpose in exhibiting his machinery to the public, will be allowed to work under a pressure greater than 45 lbs. per square inch; and coke, or smokeless coal, only may be used.

STEAM ENGINES.—All engines must be fitted with a steam-indicator, in addition to the ordinary spring-balance.

The Society will not, in any case, hold itself responsible for any loss, damage, or mis-delivery of implements, or other articles exhibited at the Society's shows.

SILK WORMS.

In consequence of the epidemic sometime since amongst silkworms in France, Lombardy, and other places in Europe, large numbers of silkworm eggs have been imported into these places from the Morea, Adrianople, Broussa, Persia, and China. The eggs from China are sent *via* San Francisco. A consignment of 1,800 lbs. of these eggs—which would contain upwards of 860,000,000 in number—was expected at the above-named port a short time since. Silkworm eggs are worth about 18s. per lb. in China, and from two to three guineas per lb. in Europe. France yearly consumes the product of 64,000 lbs. of silkworm eggs, and Lombardy the product of 140,000 lbs.—*Californian Paper.*

CERTIFICATED TEACHERS OF SCIENCE.

The following Statement of the Results of the Examination of Candidates for Teachers' Certificates in Science, held in November, 1861, under the Minute of the Committee of Council on Education of the 2nd June, 1859, will be useful to the Institutions in Union with the Society of Arts, as showing where competent teachers may be obtained:—

SUBJECT I.—PRACTICAL PLANE, AND DESCRIPTIVE GEOMETRY, MECHANICAL AND MACHINE DRAWING, AND BUILDING CONSTRUCTION.

Subdivision 1.—Practical Plane, and Descriptive Geometry.

1ST GRADE CERTIFICATE.

Raimbach, David, W., School of Art, Birmingham.
Chadwick, John, Modern Free School, Macclesfield.

2ND GRADE CERTIFICATE.

Woodcock, Fred. W., St. Martin's School, Leicester.
Mellor, James, Hollinwood, Manchester.

3RD GRADE CERTIFICATE.

Constable, John, Boys' School, Christleton, Chester.
Four failed.

Subdivision 2.—Mechanical and Machine Drawing.

1ST GRADE CERTIFICATE.

Raimbach, David W., School of Art, Birmingham.
Rowden, William, Trade School, Bristol.

2ND GRADE CERTIFICATE.

Constable, John, Trade School, Christleton, Chester.
Mellor, James, Hollinwood, Manchester.
One failed.

Subdivision 3.—Building Construction.

1ST GRADE CERTIFICATE.

Raimbach, David W., School of Art, Birmingham.
Chadwick, John, Modern Free School, Macclesfield.

2ND GRADE CERTIFICATE.

Mellor, James, Hollinwood, Manchester.
One failed.

SUBJECT II.—MECHANICAL PHYSICS.

Subdivision 1.—Theoretical Mechanics.

1ST GRADE CERTIFICATE.

Rowden, William, Trade School, Bristol.

2ND GRADE CERTIFICATE.

Stockton, William, Navigation School, Poplar.
Maver, David, Mechanics' Institute, Aberdeen.
Wood, Charles S., School of Mines, Bristol.
Stirrup, Thomas, Saint Mark's College, Chelsea.

3RD GRADE CERTIFICATE.

Meaden, Henry P., Haslingden.
Coomber, Thomas, Trade School, Bristol.
Greenstreet, William H., National School, Evesham.
Scaping, Zebedee, Navigation School, Hull.
One failed.

Subdivision 2.—Applied Mechanics.

2ND GRADE CERTIFICATE.

Rowden William, Trade School, Bristol.

3RD GRADE CERTIFICATE.

Duffy, John N., County School, Leicester.
Stockton, William, Navigation School, Poplar.
Two failed.

SUBJECT III.—EXPERIMENTAL PHYSICS.

Subdivision 1.—Acoustics, Light, and Heat.

1ST GRADE CERTIFICATE.

Clement, Leonard, East Lancashire Union of Institutions, Burnley.
Davis, Uriah J., Upton St. Leonards, near Gloucester.
Meaden, Henry P., East Lancashire Union of Institutions, Haslingden.
Abbott, Joseph, Collegiate Institution, Liverpool.
Allott, James, National School, Ruabon, North Wales.
Eardley, Francis, National Model School, Belfast.
Hargreaves, John, National School, Goldsborough, Knaresborough.
Wheeler, George Henry, National School, Middleton, near Manchester.

2ND GRADE CERTIFICATE.

Bartley, George C. T., Stoke Newington.
Bithell, Richard, Kingsland British School, Stoke Newington-road, N.
O'Neill, Charles, 92, Grosvenor-street, Manchester.
Rowden, William, Trade School, Bristol.
Hudson, Fearnside, 68, Corporation-street, Manchester.
Douglas, John C., London Birkbeck School, Chancery-lane.
Nicholson, William, Longwathby, Penrith.
Burchill, Samuel H., Navigation School, Mercer-street, Shadwell.
Briggs, James A., London Birkbeck School, Chancery-lane.
Cattell, Thomas, National School, Cottesmore, Oakham.
Trower, Richard, 50, West Hill-street, Brighton.
Farncomb, E., Preparatory School, Greenwich.
Shore, Thomas William, Church of England School, Churcham, near Gloucester.

3RD GRADE CERTIFICATE.

Turner, George, National School, Queenshead, Halifax.
Mackrell, Isaac, Wesleyan Training College, Westminster.
Patchett, Isaac, Queenshead Schools, Halifax.
Bowen, Edward, 39, Hutchinson-street, West Derby-road, Liverpool.
Brears, William, Tandridge School, Godstone, Surrey.

Subdivision 2.—Magnetism and Electricity.

1ST GRADE CERTIFICATE.

Allott, James, National School, Ruabon, North Wales.
Abbott, Joseph, Collegiate Institution, Liverpool.
Deverell, W. T., Buenos Ayres, South America.

2ND GRADE CERTIFICATE.

Bithell, Richard, Kingsland British School, Stoke Newington-road, N.
Davis, Uriah J., Upton St. Leonards, Gloucester.
Pearce, William, Maber-lodge, Portswood, Southampton.
Eardley, Francis, National Model School, Belfast.
Clement, Leonard, East Lancashire Union of Institutions, Burnley.
Douglas, John C., London Birkbeck School, Chancery-lane.
Jones, Thomas, Halton, Hastings.
Shore, Thomas William, Church of England School, Churcham, near Gloucester.
Goffin, Robert, Endowed School, Exton, Oakham.
Cattell, Thomas, National School, Cottesmore, Oakham.
Briggs, James A., London Birkbeck School, Chancery-lane.
Patchett, Isaac, Queenshead Schools, Halifax.

3RD GRADE CERTIFICATE.

Bartley, George C. T., Stoke Newington.
O'Neill, Charles, 92, Grosvenor-street, Manchester.
Bowen, Edward, 39, Hutchinson-street, West Derby-road, Liverpool.
Burchill, Samuel H., Navigation School, Mercer-street, Shadwell.
Hudson, Fearnside, 68, Corporation-street, Manchester.
Jackson, William, Hunsingore, near Wetherby.
Five failed.

SUBJECT IV.—CHEMISTRY.

Subdivision 1.—Inorganic Chemistry.

1ST GRADE CERTIFICATE.

Beesley, Thomas, 5, High-street, Banbury.
Baldock, John Henry, 55, Saint James's-road, Hollo-way, N.
Woodcock, Frederick W., St. Martin's School, Leicester.
Hudson, Fearnside, 68, Corporation-street, Manchester.
Mason, James, 100, Upper Thames-street, E.C.
Bithell, Richard, British School, Kingsland, N.
Wire, Alfred Philip, Training College, Battersea.
Hotchkin, Tycho Edward, County National School, Leicester.

2ND GRADE CERTIFICATE.

Rowden, William, Trade School, Bristol.
Atkins, Edward, Saint Martin's School, Leicester.
Chalk, Frank, 3, Heasman-terrace, Victoria-park, N.E.
Abbott, Joseph, Collegiate Institution, Liverpool.
Ward, George, Mechanics' Institution, Leeds.
Clough, James Cresswell, Grammar School, Dedham, Colchester.
Wild, Robert, Saint Mark's College, Chelsea.
Atkins, George, Knighton-street School, Leicester.
Stockton, William, Navigation School, Poplar.
Warner, William, Training College, Battersea.
Mayer, John, Carlton-place Secular Schools, Glasgow.
Samuelson, Newton, 7 and 9, Hackin's Hey, Liverpool.
Orkney, Daniel C., Free Church School, Jamestown, Dumbartonshire.
Coles, Ferdinand, 9, Walpole-street, Chelsea.
Manser, William, Training College, Battersea.
Patchett, Isaac, Queen's Head Schools, Halifax.
Snelus, George James, Christ Church School, Macclesfield.
Bownas, John, The Green, Calne, Wilts.
Taylor, Charles, Training College, Battersea.
Berriman, John, Training College, Battersea.
Bocharoff, Alexis, 17, Elton-street, Lower Broughton, Manchester.
Brown, Moses, Training College, Battersea.
Gatehouse, James Wright, Training College, Battersea.

3RD GRADE CERTIFICATE.

- Crawley, Samuel, Saint Mark's College, Chelsea.
 { Bentley, Buzi, Training College, Battersea.
 Trower, Richard, Saint Peter's School, Brighton.
 Woollett, John, Saint Mark's College, Chelsea.
 High, William R., Saint Mark's College, Chelsea.
 Jones, Thomas, Halton, Hastings.
 Swaine, James, Bridge-street, Frome, Somerset.
 { Dixon, Frederick T., Saint Mark's College, Chelsea.
 Moore, Thomas, Trinity College, Battersea.
 King, Thomas, County School, Leicester.
 { Goffin, Robert, Endowed School, Exton, Oakham.
 Lloyd, William, Saint Mark's College, Chelsea.
 Bright, William, 17, Bute-st., Cromwell-lane, Brompton.
 Two failed.

Subdivision 2.—Organic Chemistry.

1ST GRADE CERTIFICATE.

- O'Neill, Charles, 92, Grosvenor-street, Manchester.
 Beesley, Thomas, 5, High-street, Banbury.
 Woodcock, Frederick W., Saint Martin's School, Leicester.

2ND GRADE CERTIFICATE.

- Hargreaves, John, National School, Goldsborough, Knaresborough.
 { Atkins, Edward, Saint Martin's School, Leicester.
 Meaden, Henry P., East Lancashire Union of Institutions, Haslingden.
 Abbott, Joseph, Collegiate Institution, Liverpool.

3RD GRADE CERTIFICATE.

- Atkins, George, Knighton-street School, Leicester.
 Samuelson, Newton, 7 and 9, Hackin's Hey, Liverpool.
 Hotchkin, Tycho E., County National School, Leicester.
 { Baldock, John Henry, 55, St. James's-road, Holloway, N. Orkney, Daniel C., Free Church School, Jamestown, Dumbartonshire.
 Mason, James, 100, Upper Thames-street, E.C.
 King, Thomas, County School, Leicester.
 Three Failed.

SUBJECT V.—GEOLOGY AND MINERALOGY.

Subdivision 1.—Geology.

1ST GRADE CERTIFICATE.

- Morton, George H., 7, London-road, Liverpool.
 Jarman, George, Almondbury, Huddersfield.

2ND GRADE CERTIFICATE.

- Noble, John, Working Men's College, Halifax.
 Spencer, James, 17, New-street, Charles Town, Halifax.
 Fulton, Hugh, Trade School, Bristol.
 Chadwick, John, Modern Free School, Macclesfield.
 { Dowling, John, 24, Irish Town, Clonmel.
 Watkins, James, The College, Dulwich.

3RD GRADE CERTIFICATE.

- { Jones, Thomas, Halton, Hastings.
 Puckett, Joseph, 14, Goldington-street, St. Pancras-road, London.
 One failed.

SUBJECT VI.—NATURAL HISTORY.

Subdivision 1.—Physiology.

1ST GRADE CERTIFICATE.

- Beveridge, Robert, 2, Upper Kirkgate, Aberdeen.
 Douglas, John C., London Birkbeck School, Chancery-lane, London.
 Rüntz, James, Birkbeck School, Kingsland, London.
 Pike, Robert W., Birkbeck School, Bethnal-green, London.
 Birkenhead, Edward H., Mining School, Wigan.
 Tindall, George, Grove-street, Huddersfield.
 Mayer, John, Secular School, Carlton-place, Glasgow.

2ND GRADE CERTIFICATE.

- Howard, John, Lower Islington Public School, London.
 O'Neil, Charles, Working Men's College, Salford.

- { Beale, John Hill, Science School, Banbury.
 Jones, Thomas, Halton, Hastings.
 Tate, Ralph, Science School, Belfast.

3RD GRADE CERTIFICATE.

- Swaine, James, Bridge-street, Frome, Somerset.
 One failed.

Subdivision 2.—Zoology.

1ST GRADE CERTIFICATE.

- Beveridge, Robert, 2, Upper Kirkgate, Aberdeen.
 Tate, Ralph, Science School, Belfast.
 Birkenhead, Edward H., Mining School, Wigan.
 Tindal, George, Grove-street, Huddersfield.

2ND GRADE CERTIFICATE.

- Howard, John, Lower Islington Public School, Islington.
 Swaine, James, Bridge-street, Frome, Somerset.

3RD GRADE CERTIFICATE.

- Beale, John Hill, Science School, Banbury.

SUBJECT VII.—BOTANY.

Subdivision 1.—Vegetable Physiology and Economic Botany.

1ST GRADE CERTIFICATE.

- Beveridge, Robert, School of Science and Art, Aberdeen.
 Mayer, John, Secular School, Carlton-place, Glasgow.
 Jarman, George, Central School, Almondbury.
 { Dowling, John, Science Schools, Cork and Clonmel.
 Sharp, Charles J., 15A, Upper North-place, Gray's-inn-road.
 Tate, Ralph, Science Classes, Belfast.

2ND GRADE CERTIFICATE.

- Bithell, Richard, Kingsland British School, Stoke Newington, N.
 { Noble, John, Working Man's College, Halifax.
 Wheeler, George Henry, National School, Middleton.

3RD GRADE CERTIFICATE.

- M'Farlane, Archibald, Hodge-lane, Salford.
 Farncomb, E., Preparatory School, Greenwich.
 One failed.

Subdivision 2.—Systematic Botany.

1ST GRADE CERTIFICATE.

- Beveridge, Robert, School of Science and Art, Aberdeen.
 Tate, Ralph, Science Classes, Belfast.
 Dowling, John, Science Schools, Cork and Clonmel.

3RD GRADE CERTIFICATE.

- M'Farlane, Archibald, Hodge-lane, Salford.
 One failed.

AURIFEROUS ROCKS OF VICTORIA.

The area of the quartz-bearing rocks at Victoria, in Australia, is estimated at 25,000 square miles. The total area of the extent of land at present mined upon in that colony is 561 square miles. Thus 89,920 square acres have produced gold to the amount of £92,787,236, on an average of about £1,032 per acre, and there yet remains upwards of 15,000,000 acres almost everywhere intersected by quartz veins of greater or less thickness, which are as yet intact by the pick of the miner.

THE GREAT MONT CENIS WORKS.

M. Sommeiller, who is directing in chief the great works connected with the perforation of Mont Cenis, in a letter, states that everything is proceeding satisfactorily. Hitherto the boring has been carried on at the south end, but in January or February vast machines will be set to work on the north side also. Progress is now being made at the rate of about seven feet a day, and this speed will be doubled by February; but it will take at least six years more to accomplish this extraordinary and almost superhuman task.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(Continued from page 90.)

NITRATE OF SODA AT IQUIQUE (PERU).—As Iquique is the centre of this trade, and to it its present importance is wholly to be attributed, it is thought to be advisable to convey in this report as much information as can be procured as to this article, and in order that such information shall be truthful, the writer has availed himself of the views of several Englishmen at present engaged in the trade.

About from six to fourteen leagues from the coast, and running parallel with it through the province, at an elevation of 3,300 feet or thereabout, is the Pampa of Taramugal. This plain or pampa was a sea lake, and the greater part is covered with salt along the western border; and generally not extending eastwards more than 500 yards from the verge of the old lake is found the "caleche" or "terra salitrosa," rough nitrate. Between the pampa and the coasts exist other old sea lakes, on the borders of which "caleche" is also found; but these deposits are of secondary import. The "caleche" is generally found in insulated masses, irregular in shape and thickness, which adds greatly to the expense of working. It is sometimes found with only a few inches of sand over it, but more frequently covered with a hard stone, consisting of sand indurated with salt; this is called "costra," the thickness of which varies from one to ten feet, but averages three feet. The "caleche" varies in thickness from one to nine feet, but in general runs from three to four feet; below this exists a soft sand, containing an abundance of crystals of glauberite and small quantities of borates of lime and soda. The strata consist of

1. Loose sand, a few inches thick.
2. Hard sand, indurated with salt, from one to ten feet thick.
3. "Caleche," from one to nine feet thick.
4. Soft sand, or cora.

The caleche varies in quality from nearly pure salt to 50 and 60 per cent. of nitrate, generally containing the following substances:—

Earthy matter.
Nitrate of Soda.
Chloride of Sodium.
Sulphate of Soda.
Lime.
And traces of Chloride of Magnesium, and
Iodides and Bromides.

It is impossible to state the respective proportions, as they vary with every different sample. The method of extracting and refining nitrate of soda is as follows:—

When "caleche" is required, the barretero (miner) makes holes in the ground where he expects to find it. If successful, he fills up the holes with coarse gunpowder made on the spot (costing three-and-a-half dollars per quintal), regulating the charge in proportion to the thickness and hardness of the "costra" and the thickness of the caleche; the charge varies from one to eight quintals, and occasionally as much as fourteen quintals; when blasted the whole mass is turned over and mixed. He then proceeds to separate the "costra" and "cora" from the "caleche," throwing aside all the latter that he does not believe to contain more than ten or twelve per cent. of nitrate; it is then broken into smaller lumps, to be conveyed to the "paradas." A refinery of nitrate is called an "Oficina," and is generally placed in the centre of the calecheros or nitrate grounds, and consists of one or more paradas; a parada is a pair of round iron boilers, each holding from 70 to 300 gallons; these are placed together, in rough stone work, with a fire-place between them. At the parada, the acendrador breaks the lumps into pieces about the size of a fist, rejects the inferior pieces, so as to bring the whole to about 25 to 35 per cent. of nitrate. It is now thrown into the boilers with a quantity of water; after boiling some two or three hours,

the fondeador (boiler), continually stirring the mass, supposing that the caleche is by that time exhausted, throws out the ripio (refuse), adds more caleche and mother water; and, after boiling some two or three hours, a well saturated solution is obtained; it is then by hand baled into a deposit, from whence, as soon as the mud and salts are deposited, it is baled into shallow coolers, where it crystallizes. The mother water is then drawn off and the nitrate thrown out to dry. The paradas are charged twice a day, and the daily product is from fifteen to twenty quintals of nitrate, containing about 3 per cent. of impurities, chiefly common salt. The average cost of a quintal of nitrate is:—

Barretero, breaking out	. . .	12½ cents.
Acendrador, assorting	. . .	6½ "
Fondeador, boiling	. . .	12½ "
Powder for blasting	. . .	6½ "
Asses bringing the caleche to the paradas	. . .	3 "
20 lbs. coals at 1.50 dol. per quintal	. . .	30 "
Wear and tear of parada, reparations, and depreciations	. . .	29½ "
		1.00 dol.

This system of making nitrate is the same as was first adopted at the commencement of the trade, and unquestionably well adapted for that early period, having the advantage of being simple, easily understood and worked; yet it is still continued, and the whole system of labour arranged to it. It is almost impossible to conceive a system more rude and more wasteful; and although many exertions have been made during the past ten years without success to improve it, yet that want of success has been caused chiefly by the lack of skilled labour in the province; still there is no doubt that it will be superseded, in the course of a few years, by the more refined and complicated apparatus now being introduced. The theory of the process of refining nitrate is this:—"Caleche" consists of nitrate of soda, chloride of sodium (common salt), and earthy matter (the other substances present exist in such small quantities that they are overlooked), and as chloride of sodium is very little more soluble in boiling than in cold water, whilst nitrate of soda is comparatively insoluble in cold but very soluble in hot water, it is very evident that it is only required to add such quantities of "caleche" to boiling water to procure a strongly saturated solution; the earthy matter, being insoluble, is left with the excess of common salt in the boiler, or the deposit, before it is discharged into the coolers, where, as the liquid cools, it deposits the excess of nitrate of soda, the mother liquor retaining nearly all the salts in solution. Reverting to the customary process of refining, two systems are now being tried, which use steam; in the one (Gamboni's patent) the "caleche" is placed in an inverted semi-cone, with a perforated cover and bottom; through the side a jet of steam is introduced, mother water is thrown on the cover, and the refined nitrate falls through the bottom, and is at once conveyed to the coolers; in the other, steam is introduced to boil the solution, but both promise the same advantages—economy in the make and a superior article.

No sketch of the nitrate trade would be complete without some reference to the abuses. In the first it is badly based. The merchant makes advances to the salitreros, or officineros (makers), of money and goods, on the promise of receiving in return the product of the officina. This advance frequently is used in paying off old debts, or in advances to the labourers. The merchant must still keep advancing barley for the troops, coals and provisions for the labourer, &c., or there will be no nitrate forthcoming. This system trenches heavily upon the merchant's resources, and occasionally leads to losses. The officineros, as a body (with some exceptions), are a reckless set of men, wasteful in their expenditure and careless of their promises. Their arrangements with their labourers are also bad, their principal ones, the barretero, acendrador, and fondeador,

being paid according to the product of the parada; reeriminations are ever recurring, and not unfrequently leading to a closing of the works. Another thing must also be noticed—the great amount of adulteration that has taken place within the three past years. Rarely a cargo leaves that is less worse than 5 per cent., some even 7 to 10, and some samples assayed have shown as much as 30 to 50 per cent. of foreign matter. The adulteration is effected in two ways; in one, white “caleche” is ground and mixed with the refined nitrate; this is called green nitrate; the other, the powdered “caleche,” is mixed into the solution, and at once put into the coolers; this is dirty nitrate. This is in some measure protected by the present state of the trade. Merchants in England purchase from the importer, and get a deduction from him corresponding to the amount of foreign matter in the article; but as the general sales are made without any deduction, then the worst cargoes are the most profitable to the merchants.

The province has not been thoroughly surveyed; but enough “caleche” has been discovered to yield an increased supply for ages. In May, 1856, there were about 100 oficinas at work, with about 250 paradas, but the work is not constant; 240 days is a good year's work. The principal sales of this article are made in Valparaiso on the usual terms, viz., ore well sacked, not to contain less than 95 per cent. of nitrate placed in the ship's launch outside the surf. The price has been very fluctuating, commencing at 18 reals, rising to 20 reals, falling to 16 reals, and then in four months rising to 23 reals, but taking an average price of 19 reals; 936,719 quintals, with the exchange at 46 dollars, would give £426,402 5s. 10³/₄d. The other salts found in the province are chloride of sodium, biborates of lime and soda, sulphates of lime and soda, magnesian alum, &c. Iodine exists with the nitrate, and throughout the calecheros traces of boracic acid have been found in the water.

SPECIFICATIONS OF PATENTS.

The following is an extract from the Ninth Annual Report to the Council of the city of Manchester on the working of the public free libraries:—

The references to the Specifications of Patents for the year have amounted to 31,103, being an increase upon the preceding year of 1,862.

The following is a statement of the total number of reference to the Specifications from 1857 inclusive:—

	References.
Total number of references, 1856-57	20,877
“ “ 1857-58	27,856
“ “ 1858-59	36,972
“ “ 1859-60	29,241
“ “ 1860-61	31,103

146,049

Amongst the specifications inquired after, the following are given as examples:—

Subjects referred to.	No. of References.
Textile fabrics and processes connected therewith	10,086
Steam and steam engines	2,481
Gas manufacture	1,458
Railways and railway rolling stock	1,304
Sewing machines	1,275
Metals and metallic substances	1,060
Engraving and printing	768
Oleaginous substances	582
Water and other fluids, conducting and filtering	573
Building materials and processes	502
Telegraphs and signals	500
Dyeing and colouring	483
Motive power and propulsion	81
Miscellaneous	9,950
Total	31,103

POSTAL COMMUNICATION WITH FRANCE.

Under the provisions of a new postal convention recently concluded with France, on the 1st January, 1862, and thenceforward, patterns of merchandise (such patterns being in themselves of no intrinsic value), may be transmitted by post between the United Kingdom and France and Algeria under the same regulations that are applicable to, and at the same reduced rates of postage that are chargeable upon, printed papers.

Home Correspondence.

SMOKE—ITS USE TO PURIFY THE AIR.

SIR,—There is no less merit in the advocacy of a principle by Dr. Stenhouse because it is not a new discovery of his—a principle which I enunciated in the *Times* seven years ago; but when it is supported and sanctioned by so able an authority, it may interest many of your readers to learn how closely Dr. Stenhouse follows my views (pretty severely handled at the time), by comparing his letter, which appeared in No. 475 of the *Journal*, with mine in the *Times* of September 15th, 1854, and which I now append:—

“LONDON SMOKE—ITS USE TO PURIFY THE AIR.—Justice demands that the good qualities of smoke should now be shown. In an artistic view of it, smoke is undoubtedly a great evil, because it blackens our buildings, and casts shadows upon them where there should be light; nevertheless, smoke is not an unmitigated evil; in a sanitary or chemical point of view it is very beneficial, for it purifies the air when contaminated with the poisons of malaria. Smoke, in truth, is nothing more than minute flakes of carbon or charcoal. Carbon in this state is like so many atoms of sponge, ready to absorb any of the life-destroying gases with which it may come in contact. In all the busy haunts of men, or wherever men congregate together, the surrounding air is, to a certain extent, rendered pernicious by their excretions, from which invisible gaseous matter arises, such as phosphuretted and sulphuretted hydrogen, cyanogen, and ammoniacal compounds, well-known by their intolerable odour. Now, the blacks of smoke (that is, the carbon) absorb and retain these matters to a wonderful extent. Every hundred-weight of smoke probably absorbs 20 cwt. of the poisonous gases emanating from the sewers and from the various works where animal substances are under manipulation, by fell-mongers, for instance, fat-melters, bone-crushers, glue-makers, Prussian blue-makers, &c. This accounts for the fact that London, although the most smoky, is yet the healthiest metropolis in the world. In waging war, therefore, against smoke as an artistic evil, it is not wholly wise to dispense with it, on account of its sanitary value. Before we try to throw off the cloud-cap of London, we should shut off the sewers from all upward communication with the streets, embank the Thames, and, by an Act of Parliament, send the bone-crushers to Salisbury plain. As London is at present constituted, smoke is the very safeguard of the health of the population; it is unquestionably the mechanical purifier of a chemically-deteriorated atmosphere.—SEPTIMUS PIESSE.”

While it will be seen how we agree as to the disinfecting properties of carbonaceous smoke, it is fair to say that the properties which Dr. Stenhouse attributes to green wood smoke, I attribute to other matters therein, rather than to the “divided charcoal,” namely to the pyroigneous acid vapour, the kreasote and other numerous analogous compounds, which are evolved when green wood, cutch, &c., are burned in the open air. Comparatively speaking, green wood gives out less carbonaceous smoke than fossil wood-coal.

It is true there are volumes of vapour, but this chiefly consists of steam and the antiseptic disinfectants mentioned, the presence of which may be distinguished by the smell borne by the air miles away from the source of production.

I note here the disagreement between the views of Dr. Stenhouse and myself, because I think it important that all the disinfecting agents at our command should be understood and employed when occasion arises.

The antiseptic properties of the vapours of all kinds of incense were practically appreciated by the ancients, and I am perfectly convinced they cannot be disregarded in our own day without a penalty for neglecting their proper use.

I am, &c.,

G. W. SEPTIMUS PIESSE.

Bond-street, W., Dec. 30, 1861.

LONDON IMPROVEMENTS.

SIR.—Whilst perusing in the *Journal* the report on New Blackfriars-bridge, my memory was carried back to the reference made by our esteemed Chairman of the Council, in his opening address, to the decreased time it took to cross the United Kingdom (as compared with former times), without decrease in the time required to cross the metropolis, arising from the inability of our metropolitan thoroughfares to digest their increasing ordinary traffic. Any novel mechanical appliance for facilitating communication has thus far proved unavailable.

The growth of circumstances gives sufficient indication where improvement should commence. The abolition of Newgate market, the ruin in Paternoster-row, with a comparatively small outlay now, would give a northern view of St. Paul's. The Thames Embankment scheme, the Doctors' Commons improvements, the approaches to new Blackfriars-bridge, as well as railway works and station centralisation in this locality, all concur in giving a "now or never" opportunity to a comprehensive plan that would yield a southern and river as well as general view of St. Paul's, redeeming the buried grandeur of the noble structure from its present pent-up condition.

The great question that enters into all improvement schemes is that of cost, and appalling estimates are always formed of the supposed value of City property. Exclude, as of an exceptional character, the property in the front thoroughfares, and the group of buildings north or south of St. Paul's would be found of only equal value to any similar space in the metropolis; and let it be borne in mind that the greater part of the property north and south of St. Paul's must of necessity change its character, with, perhaps, the unfortunate result likely to be produced by individual will, the necessities of boundary or title, and a total disregard of any general plan of beauty or uniformity. From the northern side of St. Paul's, by the removal of buildings of a comparatively valueless character, a thoroughfare might be formed to intersect Farringdon-street about the centre, and, if carried through the site of existing courts and alleys, would reach the south side of Lincoln's-inn; this, with the removal of a small block of by no means costly property between Lincoln's-inn and Long-acre, would give a central direct thoroughfare from Hammersmith to Stratford—the western road to the eastern road. Ten or twenty years of national prosperity, with the action of individual interest, would alter the elevation of the structures in such a thoroughfare, to the creditable advancement of the metropolis. The cost, when compared with the result attained, any person inspecting the localities would deem comparatively trifling. Whether that cost should be defrayed from national, municipal, or metropolitan resources may be questioned, but I hope my communication may elicit the general opinion of the value of the result suggested. I may, however, be permitted to state, that during a thirteen years' residence and ratepaying in Manchester, with all reasonable prepossession of a Londoner in favour of everything "town-made," I did arrive at the conclusion that they did these things better there. Public opinion having settled the necessity for an enlarged Exchange, the enlargement was actually carried out, and improvement committees really effected improvements. If the rates were high we saw something for the money, and all this proceeded noiselessly, yet effectively, without any men in armour or Lord Mayor's show.

I am, &c.,

HENRY WEBBER.

1, Brewer-street, Golden-square,
Dec. 30th, 1861.

RAILWAY TRAVELLING.

SIR.—Mr. Hawes has submitted a series of questions to the readers of the *Journal*, in order to elicit the result of their experience as regards railway travelling.

The subject in question is of great importance, and as I think it to be materially affected by individual peculiarities, I beg to mention some further points for observation, which seem to be necessary to such an inquiry.

First, the occupation of the individual recording his experience should be always mentioned, as, for instance, barristers (as Mr. Adams has well pointed out) will be likely to suffer more than clerks, whose work is routine, and both these will suffer more than men who are engaged out-of-doors, or who get daily muscular exercise. Hard-worked men will suffer more than light-worked men.

Again, it is of importance to know whether the railway journey forms part of the daily work, as in the case of commercial travellers, or if it is an additional exertion after and before a hard day's work. In the latter case, anxiety is felt during the journeys to get to the work and home again; in the former the journey is looked upon as a part of the day's work, and the mind rests satisfied because the time and fatigue are not wasted. Thus is explained the difference experienced by the barrister and railway director, as mentioned in your journal of the 13th inst., with regard to the effect of daily railway travelling.

A third point to be noted is, whether a daily anxiety to catch the train, and the anxiety to go by a particular train, are felt as a strain by the traveller. To some I believe this is an intense evil.

Lastly, if it be found that the effect of railway travelling is only manifested upon the hard or overworked or less robust, yet that will imply that it is a burden upon all, though successfully resisted by the robust, which if absent would render all capable of greater exertion in their daily business.

As an occasional railway traveller, I have experienced a similar effect to that produced on board ship, viz., a great diminution of action in the voluntary muscular fibre, the great agent in all the abdominal and digestive functions.

I am, &c.,

ALEXANDER WALLACE, M.D., M.R.C.P.

23, Bedford-place, London, Dec. 31, 1861.

SIR.—In your issue of the 27th inst., Mr. Hawes writes as follows:—

"Mr. Baker, in his paper on this subject, assumed that constant daily railway travelling produced injurious effects on the health of railway travellers. He also suggested that the injurious effect was less in second-class carriages than in the first-class, and less in third than in second."

There are two mistakes in this sentence. 1st. I did not "assume" but *knew* that many persons suffered from railway travelling, and naturally assumed only that others might likewise experience ill effects from the same cause. 2nd. The sentence of my paper in which first, second, and third class carriages are mentioned together, runs thus:—"The improvements which have been pointed out being requisite for first-class carriages, how much more must they be for second and third class." My experience certainly does not lead me to Mr. Adams's opinion, that moderate but regular vibration is more trying than violent though irregular jolting. I have arrived at the contrary conclusion.

Mr. Hawes asks for experience as to reading on railways. I have myself always made a practice of reading, with considerable difficulty while sitting, i.e. subject to continual shaking—with no inconvenience whatever whilst standing, i.e. the body being steady. In my case the back and eyes were relieved by one and the same expedient.

I am, &c.,

T. BAKER.

Westminster, 31st December, 1861.

Proceedings of Institutions.

CROYDON LITERARY AND SCIENTIFIC INSTITUTION.—The last report, presented at the annual meeting held on Thursday, October 17th, 1861, George Price, Esq., in the chair, says that during the last few years the committee of this Institution have had the gratification of adopting one unvarying tone indicative of prosperity. The year just ended is no exception to this encouraging state of affairs. There is now suspended in the reading-room the first address of the Institution, issued in November, 1838. Twenty-three years have since elapsed and the Society has undergone considerable changes; from strength she has sunk to a feebleness approaching to a defunct state; and from prosperity to an adversity amounting almost to insolvency. In her earlier days will be found the only approach to the position of strength and activity now attained. Those who have given steady and continuous help to the Institution through these three and twenty years are to be numbered by units; most prominently amongst them is Dr. Edward Westall—in 1838 as in 1861, the first and foremost supporter of this Institution. The gross income for the year has been £914 8s. 6½d., and there is a balance of £77 0s. 3d. in the Treasurer's hands. Of this, the sum of £69 should be carried forward as being due to the ensuing year's expenditure for unexpired membership—really leaving but £8 as available balance. £40 was granted to the trustees of the Public Hall Fund for investment in shares; the sum of £34 9s. 10d. was expended for repairs, lobby and other fittings in the Hall; £155 9s. 5d. was paid for rental, rates, and taxes. The number of members enrolled during the year is:—

First quarter	823	Third quarter	822
Second ditto	823	Fourth ditto	657
Average per quarter.....781.			

The following tabular statement shows the quarterly average of members and non-members during the past four years:—

Members.	Income from		Non-Members.	Total.
	Members.	£ s. d.	£	£ s. d.
1857-58 ... 505	253	15 6	60	313 15 6
1858-59 ... 507	257	15 6	44	301 15 6
1859-60 ... 611	303	6 6	37	340 6 6
1860-61 ... 781	515	15 3	108	623 15 6

During the past year 381 volumes have been added to the library; 146 were bought, at an expense of £12 1s. 10d. to the funds of the Institution, and 100 volumes were purchased with donations of money, amounting to £16 12s., given for the purpose; in addition to which, 135 volumes have been presented. The sum of £47 has been expended in the purchase and rebinding of books. During the nine months of active operation of the Institution, the number of volumes issued from the library stands as follows:—

	Vols.
October to December, 1860	2,754
January to March, 1861	2,591
April to June, 1861	2,373

Total in nine months... 7,718

The committee have decided upon printing another catalogue, in which the classification of the books will be adopted, so that the selection of a work for perusal will be made with less difficulty than at present. The lecture season has been one of unusual success, occasionally the hall being full to overflowing. The following is the list of lectures for the past season:—The Misses Terry, entertainment; Waterhouse Hawkins, Esq., three lectures on "Extinct Animals;" W. Kidd, Esq., lecture on "Birds;" E. Wheeler, Esq., "The Induction Coil;" Orpheus Glee Union, musical entertainment; Dr. Daniel, "Queen Elizabeth," two lectures; B. Wells, Esq., musical entertainment; Miss Glyn, "Reading from Macbeth;" Basil Young, Esq., two entertainments; Robert Hunt, Esq.,

lecture, "Discoveries in Science;" R. Lidgate, Esq., "An Odd Character;" the Brousil Family, concert; George Grossmith, Esq., "Adam Bede;" Mr. and Madame Enderssohn, entertainment; S. C. Hall, Esq., "Authors of the Age;" C. Charles, Esq., "Comic Characterisation;" Quintett Union, &c., concert; and the conversazione. The following lectures were gratuitously given:—B. Waterhouse Hawkins, Esq., on "Extinct Animals," two lectures; J. Easty, Esq., "Oratory and Orators;" Robert Hunt, Esq., "Water;" Harry Chester, Esq., "Address on Institutions, &c.;" J. Bennett, Esq., "On a Watch;" Rev. J. B. Owen, "Haunted Houses;" and Rev. R. Maguire, "Curran, his Life, &c." Throughout the season the average attendance in the hall was 557—on one occasion (at Mr. Basil Young's entertainment in April last) 950 were present, some few others being unable to gain admittance. The singing classes are still conducted with success under the direction of Mr. Budd, who devotes much of his time to the purpose. Mr. J. W. Hobbs has kindly taken the presidency of the Choral Society, and gives the benefit of his talent to promote the objects of the society. The debating society was carried on with spirit and success during the winter months, and has again resumed its functions. Through an address, bearing upon the examinations of the Society of Arts, kindly given by Harry Chester, Esq., in the hall, the committee secured the co-operation of several gentlemen of Croydon, who formed a Local Board of Examiners, with the object of promoting the examination of any members of the Institution who might desire to compete for the prizes and certificates offered by the Society of Arts. The committee did not expect any great result to come from the first examinations. One of the members, Mr. Richard Gaskin, obtained a second-class certificate in English History. The attendance at the reading-rooms has been:—

October to December, 1860	2,174
January to March, 1861	2,312
April to June, 1861	2,379

Total in nine months... 6,865

Your committee have to regret the retirement of Mr. Edward Hughes, from assisting in the management. They were so impressed with the value of the services rendered by him at the different entertainments and lectures given to the members, that a testimonial has been presented to him. The Public Hall Fund has increased from £1,408 as reported last year, to £1,567 13s. 6d.

HERTFORD LOCAL EXAMINATIONAL BOARD.—A public meeting was held at the Shire Hall, on Monday evening, Dec. 2nd, for the purpose of presenting the certificates of the Society of Arts, and the prizes of the Local Board, to the successful candidates. There was a numerous attendance of the inhabitants of the town and neighbourhood. The chair was taken by the Right Hon. Wm. Cowper, M.P.; and amongst those on the platform were the Hon. Henry Cowper; Sir Minto Farquhar, Bart., M.P.; R. Dimsdale, Esq.; the Mayor (J. J. Gripper, Esq.); the Hon. and Rev. Godolphin Hastings, the Rev. J. W. Blakesley, the Rev. C. Deedes, the Rev. E. G. Arnold, &c. The Hon. Secretary (Mr. I. Marchant, jun.) read the report of the Local Board:—

"Nine names were this year sent to the Honorary Secretary for the previous Examination—eight from Hertford and one from Stapleford. Two of these candidates had passed the previous and final Examinations last year, and obtained certificates of merit for the latter. On the 4th March last, the remaining seven submitted to the previous Examination. Of these, six passed satisfactorily, and therefore became eligible for the "pass," or testing Examination, which was commenced at the Literary Institution, on the 4th March last, and continued and concluded at the house of the secretary on the 14th of that month. Passes to the final Examinations were granted to five candidates. The final Examination of the Society of Arts was held at the Literary and Scientific Institution, on the 30th of April and the 2nd and 3rd of May. The answers were in due course submitted to the examiners of that Society, and the awards of

certificates were made. (These have already appeared in the *Journal*.) In accordance with the recommendation of the Council of the Society of Arts, that Local Boards should hold Annual Examinations of persons under sixteen years of age, and grant, on their own authority, certificates and prizes, the Hertford Board resolved that (in order to encourage to a systematic course of reading, such young persons in this district as might not feel themselves able to undergo the Examination of the Society of Arts) a rudimentary examination should be held of candidates under the age of sixteen years, not receiving instruction at a day-school, and that a fund be formed for providing prizes, to be distributed according to the judgment of the Board. The subjects for such rudimentary examination were—arithmetic, composition, dictation, geography, grammar, and handwriting. Ten names were sent for examination—Six from Hertford, two from Hertingfordbury, and two from Bengoe. The rudimentary examination was held on the 4th March last, at the Literary Institution, Hertford. One of the Hertford candidates did not present himself. Nine competed for the prizes on that occasion, and the Examiners awarded the 1st prize to William Francis Crawley, of Hertford, solicitor's clerk, aged thirteen; the 2nd to Henry Newland, of Hertford, errand-boy, aged fourteen years; and "honourable mention" to Henry Brown, of Bengoe, and Martin William Farrow, of George-street, Bengoe. The expenses of the Local Board have been £13 1s. 11d."

THE CHAIRMAN said they must all sympathise with those young men, who, having reached an age when they are emancipated from the control of teachers and the restrictions of school, had devoted their leisure hours to the prosecution of studies which would be useful to them in their several walks of life, and had had the courage to appear in a public competition for prizes and distinctions in which so many of them had been successful. Self-education without some kind of assistance—except in some rare instances of strength of will and indomitable application—must be a most inefficient and insufficient means of education. Education was not a matter which could be left in the hands of those who need it. The persons who most need education were sure to be most unaware of their want; and it had, from the earliest times, been a subject in which those persons who took any interest in the public welfare had thought it necessary to interfere; and not only had the primary schools been supported by private beneficence and public grants, and our grammar-schools founded and endowed by our wealthy and benevolent ancestors—but even those schools in which the highest classes of the country are educated, owed their origin to charitable endowments. If the wealthiest classes in the land were not ashamed to avail themselves of the benefits of these charitable endowments, surely the most independent young man living need not mind being indebted to the care, consideration, thoughtfulness, and skill of the Examiners of the Society of Arts. The Examinations were just the thing that was wanted to assist the self-education of that large class of persons of the working and middle ranks, who, having left school early, desire to employ their leisure in such a manner as would tend to improve their minds, and to make them more useful in the positions of life which they might occupy. He could wish that there were a larger number of young men competing for these distinctions than he found in the list before him. But they must recollect this is only the second year that these Examinations had been conducted there, and might therefore hope that there would be a greatly increased competition in the time to come. Those who had succeeded upon the present occasion would shortly receive the certificates it was his pleasing duty to present them, and which would be a token to themselves, and their friends, of their capacity, their industry, and their attainments. Those who had gone up for the Examination, and who had not succeeded, would at least have acquired the regard and respect of their friends for their perseverance, their ambition to excel, and their willingness to undergo trouble for the purpose of being instructed; and they would not have lost their time, for they would have exercised their minds, and acquired an amount of knowledge, and gone through a process of mental disci-

pline which would certainly be useful to them through their lives. But in future the list of candidates for these distinctions must be enlarged. There were many more young men than had yet appeared in these competitions, who were not insensible to the advantage and satisfaction of being accounted well-educated young men; and he was sure those persons would see that they cannot do a wiser thing for their own interest and pleasure, than to set steadily at work, study one branch of learning—devote their minds heartily and strenuously in that particular direction—get what assistance they could, and go in for the examination, determined to get a certificate in that branch. He would suggest that employers, when about to engage young men, should ask those who present themselves, "Have you competed for a certificate, and have you been successful? If so, show me your certificate." That would be a test not only of the capacity of a young man applying for a situation, but of his willingness to work, and of his powers of application. They need not be afraid that those young men who are endeavouring to educate themselves would be less attentive and careful in the ordinary routine of their work, because they are exercising their minds on higher and larger subjects. The chairman then presented the certificates of the Society of Arts, and the prizes of the Local Board, to the successful competitors. The Prizes of the Local Board were as follows:—1st prize, William Crawley, aged 13, solicitor's clerk; 2nd prize, Henry Newland, aged 14, errand-boy; Henry Brown and Martin William Farrow (the latter an apprentice at the *Hertford Mercury* office) were "honourably mentioned." Crawley, who had undergone no special preparation for the examination, had been trained as a private pupil of Mr. J. Hannum, the English Master at Christ's Hospital. Newland had been educated in the Green-coat School. —SIR MINTON FARQUHAR, Bart., M.P., proposed the following resolution:—

"That the examination scheme established in this town deserves the support of the friends of education generally, and particularly merits the attention of young men and women residing within the district of the Local Board."

which was seconded by the Rev. H. S. WARLEIGH. The Hon. HENRY COWPER proposed—

"That the success of the candidates who have just received certificates and prizes, is calculated to encourage others to follow their commendable example."

which was seconded by R. DIMSDALE, Esq. The Hon. and Rev. GODOLPHIN HASTINGS proposed a vote of thanks to the Honorary Secretary, Mr. Marchant, jun., for his services since the establishment of the Local Board. As Deputy-Chairman of that Board, he (Mr. Hastings) was sensible how much they were indebted to Mr. Marchant. It was through his exertions that the Local Board was first called into existence; and it was mainly through his energy that they had arrived at the present satisfactory results. Mr. Marchant's services had not only been gratuitous, but, as appeared from the balance-sheet, he had paid £7 out of his own pocket, as the Secretary of the Board. He did not think it could be the wish or intention of those interested in this scheme, that Mr. Marchant should bear the expense to which he had referred; and therefore he would suggest that they should not leave the room without subscribing sufficient funds to cover the deficiency of the past year. And, that Mr. Marchant might not be placed in this position another year, he thought some of them should put down their names for a small annual subscription.—The Rev. CHARLES DEEDES said he had great pleasure in seconding the resolution. He was sure they owed a very large debt of gratitude to Mr. Marchant, for the great trouble he had taken in connection with the Local Board. The resolution was carried unanimously. Mr. J. MARCHANT, jun., acknowledged the vote of thanks. A vote of thanks to the Chairman was proposed by the Mayor (Mr. J. J. Gripper), and carried unanimously.

MANCHESTER MECHANICS' INSTITUTION.—On Friday evening, November 15th, after a social tea-party, a meeting

assembled in the lecture-room of the Mechanics' Institution, David-street,—William Fairbairn, Esq., in the chair,—in order to witness the presentation of the certificates and prizes gained by students of the Institution at the recent government and Society of Arts' examination. Among the gentlemen present were the Mayor of Manchester (Thos. Goadsby, Esq.), Alderman Curtis (the ex-mayor), T. Bazley, Esq., M.P., the Rev. Canon Richson, Prof. Newth, Dr. J. Watts, Alderman Pochin, Messrs. H. J. Leppoc, D. Chadwick, R. Rumney, J. Heywood.—The CHAIRMAN stated the object of the meeting; and while the students were taking positions near the chair, the members of the Tonic Sol-fa Choral Union sang a glee. During the evening the Choral Union sang other selections of music.—The SECRETARY, (Mr. Thos. Marshall), made a statement respecting the examinations, of which the following is an abstract:—"The results of the Society of Arts' examinations are more satisfactory than those of any previous year. The number of certificates gained is the same as in 1860, but their value ranges much higher, as the following statement will show:—Number of candidates at the Final Examination in 1860, 27; in 1861, 33. Number of papers worked in 1860, 42; in 1861, 49. Successful candidates in 1860, 21; in 1861, 25. First-class certificates in 1860, 2; in 1861, 5. Second-class certificates in 1860, 8; in 1861, 13. Third-class certificates in 1860, 21; in 1861, 13. The number of papers worked at this Institution on the last occasion exceeds that of any other in the United Kingdom, the Glasgow Mechanics' Institution only excepted; while the number of successful candidates is not surpassed by any excepting the Institution just named and the Leeds Young Men's Christian Association, where an excess of one over this Institution is recorded. Several Institutions, however, besides these just named, have surpassed ourselves in the number and value of the certificates gained in proportion to the number of successful candidates."—The CHAIRMAN, in the course of a few introductory remarks, said that with regard to science he had been a hard worker in scientific pursuits, and he knew pretty well what was necessary in order to apply natural science in a practical form, and to render it useful in the social relations of life. He could assure the students that what was necessary was not easily attained, and would not be attained without hard labour. His advice to the young members of the Institution was to work hard and spend little. That was the best way to get on in the world. He alluded with pleasure to the fact that many of the certificates were for excellence in book-keeping, and regretted that in respect to mechanical drawing the students were not so forward as they ought to be. He advised them to apply themselves assiduously and carefully to the acquisition of a knowledge of elementary geometry, in the first instance, then facility in mechanical drawing would follow much more easily.—The certificates and prizes were then distributed, and the three prizes, of the value of a guinea each, given by the president of the Institution (Oliver Heywood, Esq.), to the three students in the evening chemistry class who had gained Queen's prizes. The meeting was subsequently addressed by the Rev. Canon Richson, Messrs. Rumney, Pochin, Bazley, and Curtis; and the proceedings concluded with a vote of thanks to the chairman.—Mr. Thomas Marshall has given notice of his intention to resign his post as secretary of the Manchester Mechanics' Institution, having accepted an appointment in a mercantile house in Manchester. The Board of Directors have passed the following resolution:—"That this Board receives with regret the resignation of its secretary, Mr. Marshall, and would hereby record its high appreciation of the manner in which he has fulfilled the duties of his office, and its sincere desire that in the new line of duties he has adopted he may reap that reward which his talents, industry, and integrity so well deserve."

RYDE LITERARY AND SCIENTIFIC INSTITUTION.—The Committee have just purchased of the Ryde Book Institution, their select library, which is proposed to be incor-

porated with their present collection of books—together about 3,000 volumes, containing many works of a valuable character. The sum expended on the purchase and making suitable provision for their reception is about £100, towards this sum his late lamented Royal Highness the Prince Consort very kindly contributed £10—only a few days prior to his fatal illness. This Society had previously received evidence of his generous sympathy for works of an educational and useful nature, by having received from him the handsome donation of £25 when the Committee were seeking a more suitable building for the purposes of the Society.

MEETINGS FOR THE ENSUING WEEK.

- MON.....Geologists' Association, 7. Professor Tennant, "On Limestones."
British Architects, 8.
Entomological, 8.
Medical, 8½. "Clinical Discussion."
TUES. ...Pathological, 8. Anniversary Meeting.
Photographic, 8.
Royal Inst., 3. Professor Tyndall, "On Light" (Juvenile Lectures).
WED. ...Archæological, 8½.
Geological, 8. 1. Prof. J. Morris, and Mr. G. E. Roberts, "On the Carboniferous Limestone and Yellow Sandstone of Farlow and Oretton, Clee Hills, Salop; with a Note on a New Species of Pterichthys, by Sir P. Egerton." 2. Mr. E. W. Binney, "On some Fossil Plants, showing structure, from the Lower Coal-field of Lancashire."
Graphic, 8.
Roy. Soc. Literature, 8½.
Microscopical, 8.
THURS....Antiquaries, 8½.
Philological, 8.
Royal, 8½.
FRI.Astronomical, 8.
SAT.....Asiatic, 3.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, December 20th, 1861.]

Dated 10th December, 1861.

3098. W. E. Newton, 66, Chancery-lane—Imp. in knapsacks. (A com.)
3100. J. W. Agnew, Windsor-chambers, Great St. Helen's—A new and improved electro-voltaic pocket battery. (Partly a com.)

Dated 11th December, 1861.

3102. H. Tanner and W. Proctor, Bristol—Imp. in the method of applying manure to growing crops, and also in the machinery or apparatus to be employed for such purpose.
3104. W. C. S. Percy, Manchester—Imp. in machinery for making bricks, tiles, pipes, and other articles formed of plastic materials.
3108. W. H. Tooth, Rhodeswell-road, and W. Yates, jun., Parliament-street, Westminster—Imp. in the manufacture of iron and steel, and in the machinery, apparatus, or furnaces used therein, and for the production of gas to be employed in such manufacture.
3110. J. Leeming, North Holme Mill, Bradford—Imp. in looms for weaving.

[From Gazette, December 27th, 1861.]

Dated 16th August, 1861.

2043. J. Livesey, New Lenton, Nottinghamshire—A new textile fabric for embroidery trimmings, and other ornamental purposes, and machinery employed in making the fabric into trimmings.

Dated 29th October, 1861.

2705. E. Suckow and E. Habel, Manchester—Imp. in antifriction mechanism for receiving the end thrust of screw propeller and other rotating shafts.

Dated 22nd November, 1861.

2939. W. Evans, Commercial-road East—Imp. in obtaining motive power by machinery.

Dated 25th November, 1861.

2951. V. Pendred, jun., Kilkenny, Ireland—Imp. in the construction and materials of surface condensers.

Dated 26th November, 1861.

2967. J. Brown, 2, Ribchester-terrace, Bridge-road, Stratford—Imp. in fire bars and furnaces.

Dated 30th November, 1861.

3018. J. W. Gibson, Dublin—Imp. in ordnance applicable also to small arms.

Dated 3rd December, 1861.

3025. T. W. G. Treeby, 1, Westbourne-terrace-villas, Westbourne-square—Imp. in machines for boring holes in rocks and other hard substances.
3026. R. A. Rust, 34, Great Marlborough-street, Westminster—Imp. in the construction of the cases of pianofortes.
3029. J. Burrows, Wigan, and J. Dougan, Haigh, Lancashire—Certain imp. in winding or driving drums or pulleys.
3031. G. T. Bousfield, Loughborough-park, Brixton—An improved stopper for bottles, decanters, jars, and similar articles. (A com.)
3033. W. Duchemin, Charlotte-town, Prince Edward's Island—Imp. in blocks for hoisting.

Dated 4th December, 1861.

3035. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the manufacture of nose bags and similar articles, and in apparatus connected with such manufacture. (A com.)
3037. T. Stead and W. Higham, Ashton-under-Lyne—Imp. in machinery or apparatus for spinning cotton or other fibrous materials.
3039. J. E. Boyd, Hither-green, Lewisham, Kent—Imp. in scythes, scythe handles, and apparatus for connecting the same.
3041. W. E. Newton, 66, Chancery-lane—Imp. in pumps. (A com.)
3043. W. H. Balmain, Saint Helen's, Lancashire—Imp. in the manufacture of potash and salts of potash.
3045. A. Pullan and W. Lake, New Cross, Surrey—Imp. in traction and other engines, and in wheels for traction engines and other carriages, and in giving motion to ploughs and other agricultural machines.

Dated 5th December, 1861.

3049. G. W. Robertson, Cannon-street—Imp. in machinery for cleaning rice and other grain.
3051. W. Dicks, Floore, Northamptonshire—Imp. in pumps.
3053. W. Busby, Newton-le-Willows, Lancashire—Imp. in ploughs.

Dated 6th December, 1861.

3057. A. Woodward, R. Woodward, and W. Woodward—Improved arrangements of compound steam engines.
3059. C. Craddock, 5A, Orchard-terrace, Kensington—An improved system or method of cutting out ladies' dresses.
3061. E. Collier, Aldershot—Imp. in coverings for the feet and legs.
3063. W. Smith, Kettering—Imp. in the construction of horse hoes.
3065. H. G. Schramm, 149, Rothenburgsort, Hamburg—Imp. in rotary engines and pumps. (Partly a com.)

Dated 7th December, 1861.

3069. R. Jolley, 47, St. John-street, Smithfield—An improved apparatus for heating, cooling, or drying, infusing, extracting, or absorbing vapours or gases for manufacturing, medical, or domestic purposes, and for preserving liquids and solids, alimentary or otherwise.
3071. D. May, Wood-street—An improved method of securing scarfs and similar articles to the neck.
3073. H. W. Bristow, Jermyn-street—Imp. in the manufacture or production of candies. (A com.)
3075. T. Melldow, Oldham, C. W. Kesselmeier, Manchester, and J. Worrall, Salford—Imp. in dyeing and printing certain descriptions of woven fabrics.

Dated 9th December, 1861.

3081. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the production of relief designs on metallic surfaces for general printing, gaufering, and embossing purposes. (A com.)
3083. R. A. Brooman, 186, Fleet-street—Imp. in treating atmospheric air and other elastic fluids for motive power purposes, and in engines and apparatuses to be employed therewith. (A com.)
3085. S. W. Silver, Bishopsgate-street, and H. Pringle, King's-road, Chelsea—Imp. in shoes for horses and other quadrupeds.
3087. W. Clark, 53, Chancery-lane—Imp. in gloves. (A com.)

Dated 10th December, 1861.

3089. G. Tear, Liverpool—Imp. for facilitating the drying of wet or damaged cotton or wool or other similar fibrous material.
3091. H. Spencer, Rochdale—Imp. in machinery and apparatus for spinning and doubling cotton and other fibrous substances.
3093. J. A. J. Redier, 4, South-street, Finsbury—Some imp. in pocket watches.
3094. V. L. Dagzan, 4, South-street, Finsbury—Imp. in the method of paving roads and other places.
3095. G. C. Lock, Liverpool—Imp. in cinder sifters.
3097. W. E. Newton, 66, Chancery-lane—Imp. in breech-loading cannon. (A com.)
3099. D. Vogl, Sambrook-court, Basinghall-street—Imp. in garments for gentlemen and ladies' wear.

Dated 11th December, 1861.

3106. R. A. Brooman, 166, Fleet-street—A new or improved method of treating teasles or thistles to be used in the teasing of cloths and stuffs and otherwise. (A com.)

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

3190. O. C. Evans, Whitton, Twickenham—Imp. in sewing machines.—20th December, 1861.
3197. J. Redfern, Hanley, Staffordshire—Improved apparatus for raising the temperature of air in order to warm churches, conservatories, houses, and other buildings or places.—20th December, 1861.

PATENTS SEALED.

[From Gazette, December 27th, 1861.]

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| <i>December 26th.</i> | 1735. A. Priest and W. Woolnough. |
| 1653. J. W. Graham. | 1756. T. J. Smith. |
| 1656. S. Middleton & J. Wright. | 1805. A. Elliott. |
| 1661. J. Dyer. | 1822. M. Henry. |
| 1667. I. Bragg. | 1833. J. Cole and J. Cole. |
| 1669. W. Livesey. | 1905. A. Wood. |
| 1672. F. Potts and R. Cox. | 2251. J. H. Johnson. |
| 1674. L. H. Spence. | 2367. W. Tongue. |
| 1677. J. P. E. Paignon, J. M. Vaudaux, and G. Gagnière. | 2540. C. N. Kernot and M. D. Rucker. |
| 1693. J. F. Spencer. | 2571. J. Dixon and R. Clayton. |
| 1708. J. Hutson. | 2707. F. Bennett. |
| 1718. T. Wilson. | 2766. J. Archer. |

[From Gazette, December 31st, 1861.]

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| <i>December 31st.</i> | 1743. J. German and G. N. Browne. |
| 1679. J. G. Wilson. | 1744. T. T. Chellingworth and J. Thurlow. |
| 1690. G. Davies. | 1752. T. Reeves. |
| 1694. J. Petrie. | 1792. C. D. Abel. |
| 1695. P. Spence. | 1840. W. E. Newton. |
| 1700. J. M. Gale and T. Kennedy. | 1874. F. Johnson and B. Hockin. |
| 1709. O. Williams. | 1904. H. J. Holland and W. Paynton. |
| 1712. R. Lakin and J. Wain. | 2254. W. E. Newton. |
| 1715. J. Dean. | 2774. E. Brooks. |
| 1725. C. Farrow. | |
| 1741. C. Cochrane. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

*[From Gazette, December 21th, 1861.]**December 24th.*

2953. M. A. F. Mennons.

[From Gazette, December 31st, 1861.]

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| <i>December 31st.</i> | 25. R. Tempest and J. Tomlinson. |
| 2992. R. A. Brooman. | |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4422	Dec. 10.	Paper and Envelope in One...	{ Edward Fredk. Devenish } Walshe	Manchester-street, Manchester-sq., W.
4423	" 12.	Rein Holder	John Collins	Birmingham.
4424	" 14.	A Breast Drawer	S. Powell	{ 3, Brook's-cottages, King-street, Old Kent-road, S.E.
4425	" 16.	Chimney Damper for Register Grates ...	The Shot Iron Company ...	69, West Nile-street, Glasgow.
4426	" 18.	Watch Protector	John White	2, York-place East, Greenwich, S.E.
4427	" 18.	{ A Pair of Trowers, to be called the Arcanum	Alfred Webb Miles... ..	73, Brook-street, Hanover-square, W.

Journal of the Society of Arts.

FRIDAY, JANUARY 10, 1862.

INTERNATIONAL EXHIBITION OF
1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £442,850, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The description of the progress made during the past week must necessarily be brief, as the work now to be executed consists chiefly in putting finishing touches; indeed, the building begins to bear such an aspect of completeness, that to the uninitiated little remains to be done except colouring and decoration. Perhaps a greater advance can be detected in the Northern Courts, and this because hitherto they have been most backward.

The progress of the domes is highly satisfactory, and no doubt now remains of their completion in time. In the race between them the western one is still, in sporting language, "the favourite." It is true the ribs of the eastern dome are up, but they have been raised one at a time, so that the most troublesome task of fitting them to the ring has still to be accomplished. Mr. Ashton, who has the charge of fixing the ironwork of the western dome, taking a lesson from the slow progress on the other side, has constructed the dodecagonal ring at first on the top of the scaffold, so that the ribs are more easily guided to fit directly into their places. All these ribs have been raised simultaneously with great rapidity, and now only want the top jointings to be completely fixed.

The experiments in colouring still continue. Besides Mr. Hudson, Mr. Kelk has also made a suggestion, and the two systems can be at once compared. Captain Fowke, who has proposed a plan for colouring the machinery sheds, is about to submit one also for the nave, and by next week it is expected that the matter will be fully settled. Captain Fowke's plan, founded on the experience of the Paris Exhibition, is, to trust rather for decoration to the objects exhibited, and the colouring he will propose will be as simple as possible. In the

same manner as the exterior of the building invites decoration when the funds for that purpose are forthcoming, so the interior may be conveniently left for complete colouring to an experience which can be acquired only by degrees.

At present the different experiments give the nave a variegated and mottled appearance. A public critic has been so far misled as to suppose that this is to be the ultimate aspect of this part of the building.

The manner in which every part is lighted, and the amount of light obtained, will be found on close inspection to be highly satisfactory. No place in the building can be said to be badly off in this respect, but perhaps if any selection could be made, the nave would be pronounced at once to fulfil its requirements. The angle at which the rays fall upon the space below subdues the light to just the strength which will be required for the due exhibition of the costlier objects which it is proposed to place there.

If the hopes raised by the recent pacific news from the other side of the Atlantic are fully realised, it may be expected that the United States of America will send a number of objects sufficient to occupy a large amount of space, and Her Majesty's Commissioners are prepared to make arrangements accordingly.

THE BRITISH COLONIES AND THE INTERNATIONAL EXHIBITION OF 1862.

By P. L. SIMMONDS.

No. XII.—THE WEST INDIAN COLONIES.

Early in September (vol. ix., p. 703) I furnished an outline of the part which the British West Indian Colonies would take in the forthcoming Exhibition, and I then expressed my regret that so few of them were coming forward actively with a representation of their products. Since then, however, it is satisfactory to find that the majority of the islands have become impressed with the importance of putting in an appearance for themselves, so that they may compete creditably with the republic of Hayti, the Spanish islands of Cuba and Porto Rico, and the French colonies of Guadaloupe, Martinique, and Guiana. The French have, of late years, been especially active in developing their colonial products, as any one who has visited their permanent Exposition or Colonial Museum at the Palace of Industry, in the Champs-Élysées, Paris, can testify.

It was from Martinique that coffee was first disseminated over the Antilles, and though the culture has now been transferred very largely to Ceylon and Java, and is prosecuted more extensively in Brazil and Central America, yet the coffee of the West Indies still possesses a public interest and repute. Besides its superior coffee, Martinique also produces cocoa, cotton, sugar, and tobacco, indigo, and other dyewoods, preserved fruits, and fine straw hats. The aggregate value of the imports and exports of the three French colonies, a few years ago, was about four millions sterling.

I stated in my former communication on the West Indies, that the colonies which had expressed their intention of taking part in the Exhibition were Grenada, Trinidad, British Guiana, Guiana, Jamaica, and St. Vincent. Since then commissions have been appointed,

and active steps taken in the following islands,—the Bahamas, Barbados, Dominica, and St. Kitts. It has been said that no portion of the British dominions is less demonstrative than her colonies. This accusation may be true or not. But it would not be difficult to assign many good and sufficient reasons why the colonies should be less demonstrative than older and more highly favoured countries. The youth emerging from the trammels of schools, and tutors, and guardians, has too much of an earnest solicitude for his own welfare to spend much time, or feel any great interest in the mere progress of the world around him. His first and more immediate consideration embraces only the range of such objects as are either directly or indirectly connected with his own well-being. He has no time, and feels no aptitude for interesting himself in distant and remote objects, especially in such as are simply intended to be indicative of the world's progress in arts and civilization. These will have his attention when time and leisure have matured his views and enhanced his position, but in the meantime all his efforts are demanded to secure that amount of personal independence and relative well-doing by which the comfort and respectability of the future may be secured. Just so, in some degree, it is with the colonies; they have long been in a state of minority, and have had, and still have much to do in the way of arranging and providing for their own immediate interests. Remote from the great centres of progress and the great marts of business and commerce—isolated from the attractions of the world's splendour, and engrossed with their own immediate concerns, they feel indifferent to the demonstrations of their more favoured fellow-subjects, and take little interest in what does not concern them. The resources of richer and more fortunate colonies enable them to enter the lists of competition with more spirit, while such as are only emancipating themselves from the meshes of misfortune, are too busily employed to think much, or speculate greatly, on the progress of art or the triumphs of science.

Whatever brings countries and colonies into comparative and competitive contrast, tends to stimulate the zeal of their respective inhabitants, awakens energy, rouses to effort, and introduces improvements. The products of a country are an image of its development, and the industry of a country discloses the secret springs of its enterprise and success, and these together illustrate the causes of its prosperity, or of its decay. Production is a proof of civilization, and unproductiveness is an evidence of poverty and barbarism. The former is an ascending movement towards a higher degree of physical comfort—the latter is a descending movement towards a lower state of physical misery.

A glance at happy England and her rich colonies abundantly illustrates the glorious results of productive industry, but the International Exhibition itself is designed to afford on the largest scale the same proof from all parts of the globe. It will be a grand emblazoned picture of the practical effects of human industry, under the guidance of art and science—a revelation written within and without of the riches, power, influence, wealth, comfort, and happiness that flows in upon man from his skilful appliance of the resources which an all-wise Creator has placed around him in the material world. To have a name and a place in such an Exhibition is of itself no mean honour.

In the BAHAMAS the Acting-Governor has appointed the following gentlemen Commissioners:—The Honourables John C. Lees, Wm. Henry Doyle, T. Chapman Harvey, G. D. Harris, and W. D. Kirkwood, and Messrs. J. S. George and Timothy Darling. The Commissioners met on the 15th ult., and the Hon. G. D. Harris accepted the office of Hon. Sec., and Mr. S. Harris, of 27, Mansell-street, has been appointed London Commissioner. The Duke of Newcastle has authorised a vote of £100 from the Crown funds of the colony for the defraying any contingent expenses. The Local Commissioners having entered with promptness and cordiality on the performance

of their duties, there is reason to hope that the Bahamas will be adequately represented at the Exhibition, although the range of products of the islands is not large, comprising chiefly sponge, salt, pine-apples, shell-work, timber, palmetto plait, and agave fibre.

The Governor-General of BARBADOS has requested Mr. Stephen Cave, M.P., to act as Commissioner in London for this island, and a very fair representation of its products and industry is likely to be made. Besides its staples of sugar and arrowroot, cotton, and fibres, aloes, petroleum, or green tar, and other medicinal products, there will be cases of mosses and shell work, silk-cotton, and flowers and fruits of the island modelled in wax. One hundred feet of space has been allotted to this island.

In DOMINICA the legislature has voted a small sum of money, £50, for the purpose of forming a collection of island products. A Commission has also been appointed by the Lieut.-Governor, of which the Hon. John Imray, M.D., is chairman. That gentleman is actively engaged, and is bringing his scientific knowledge to bear in the matter. Samples of the chief exports, sugar, molasses, rum, coffee, cocoa, tous les mois, arrowroot, manioc, &c., will be sent. Dominica has no manufactures, but the island is especially rich in beautiful and valuable wood, and the collection of some 60 or 70 varieties that will be sent will be interesting. The samples will be in slabs about a foot square, and 1 to 1½ inch thick, with the scientific name of the tree and the quality and application of the wood attached to each.

GRENADA.—The House of Assembly, acting upon the suggestion of the Lieut.-Governor, has appointed a Commission consisting of the following gentlemen:—Messrs. Davison (chairman), Purcell, Hall, Alexander, Sinclair, Steele, and Dr. Wells, from among its body to facilitate the transmission of articles. The planters, however, were not in the best of spirits to make any exertion, as they had experienced the worst crop season they had had for many years, and from the continuance of heavy rains, not more than two-thirds of the crop of the island had been reaped, and the produce made being generally of an inferior quality, has commanded lower prices than usual in the market.

Another cause of despondency is the disappointment in not having received any addition to their scanty supply of labour by the importation of Coolies, which they had been expecting for the last two years. These two causes combined had thrown a gloom over their prospects, which led them to take little interest in making a collection of products. Mr. Thomson Hankey, M.P., the Colonial Government agent here, has, however, been stimulating the colonists to some exertion, and it is expected the colony will fill a small space of 12 square feet with samples of cotton (from Carriacou), cocoa, nutmegs (which gained the prize in 1851), and other spices, starches, and sundry minor articles.

In JAMAICA considerable activity has at length been manifested, and there is an earnest desire to be well represented. The Council of the Royal Society of Arts, which acts as the Island Commission, has memorialized the Governor in Council, praying that in the annual grants to be proposed to the House of Assembly at the forthcoming session, the sum of £1,000 be may included to enable the Council to carry out their plans for the effectual representation of the colony. A Kingston paper thus writes on this subject:—

“A thousand pounds might appear a large sum to those who have faith in the hideous cries of the ruin-mongers who, for years past have been endeavouring—and we are sorry to say not without some degree of success—to convince the world that this country has sunk to the lowest depths of destitution and misery; but to those who know the purposes for which those cries are raised, and who further believe that this country is yet rich both in material resources and trade, the sum of money prayed for by the Society of Arts will not appear extraordinary. It is, moreover, to be considered that the money is not desired for any ordinary undertaking. It is to carry out a purpose, and to fulfil an object in which the whole world takes an

interest, and expects us to act. This expectation is the more remarkable on the part of the people of the mother country. They are bringing together the industries of all parts of the earth, and it is fitting that British Colonies, wherever they are to be found, should also be present; they are desirous to find out what new channels of commerce have been opened up, and what new articles of trade have been made known during the past ten years. Jamaica has resources which may not only prove her wealthy, but render her once more important to the commerce of the world; it is, therefore, necessary that when people from every foreign clime are hastening to London to present the proofs of their industry and enterprise, bearing in their hands samples of the natural resources of their several countries, that the people of Jamaica should show themselves equal in the race, and manifest an equal eagerness to avail themselves of the advantages which the Great Fair will hold out to the people of the entire civilised world. Objects of this kind cannot be carried out by the entire people of the country. They must be left to a few active minds who are willing to act. Such an active power Jamaica most fortunately possesses in the Council of the Royal Society of Arts. The gentlemen of whom the Council is composed are scientific men, who fully understand and appreciate the work in hand, and they have manifested a zeal which is peculiar to men of science in matters congenial to their taste and study; but giving their time and personal service are all that they can be expected to give. They must be furnished with the indispensable pecuniary means from other sources, and, as we have shown on a former occasion, the proper source is the public purse. The colonists of Demerara have cheerfully expended a thousand pounds, and why may not the Jamaicans do the same? Why may we not expend a thousand pounds to uphold the dignity of our country, and, at the same time, make its resources known to the world—we, who pay average taxes of £260,000 per annum?—we, who expend annually over £30,000 to collect our revenues?"

Mr. Lucas Barrett, F.L.S., F.G.S., the government geologist, will make a selection of the economic minerals collected by the geological surveyors in the island, which will consist of the following sets:—

1. Metals and metallic ores—copper, iron, zinc, and lead ores.
2. Minerals used in the arts and manufactures—manganese, cobalt, sulphate of barytes, &c.
3. Minerals used in agriculture as manures—gypsum, phosphate of lime, shell sand, &c.
4. Rocks and minerals used in the construction of buildings—building stones, limestones, and marbles.

The value of a collection of this kind is greatly increased by the addition of mining plans and geological maps, and is rendered more intelligible by a descriptive essay. Mr. Barrett therefore intends sending copies of the plans of the lodes from which the minerals were obtained, and the geological maps of the districts in which they occur, together with a short account of the geology of Eastern Jamaica, and a descriptive catalogue of the collections, which he may be able to personally arrange in the building should he obtain official leave of absence, as he has been nominated one of the London Commissioners.

The Jamaica Cotton Company apply for a space of about 120 feet, to exhibit specimens of cottons, plantain, rhea, and other vegetable fibres of the island. The list of products and articles intended to be sent from Jamaica is a large and interesting one, but far too voluminous for enumeration in the *Journal*.

At a special meeting of the Hanover Society of Industry, held in the Court House, Lucea, on the 10th September, it was unanimously and cordially resolved to co-operate with the Royal Society of Arts of Jamaica in procuring for the Great International Exhibition a collection of suitable specimens of the productions of Hanover and the adjoining parishes.

The importance of the object in the present circum-

stances of Jamaica can hardly be over-estimated. In the Exhibition of 1851, Jamaica was entirely unrepresented. It is impossible to calculate the loss which the island sustained in consequence of this neglect—and, were the present opportunity neglected, it would certainly be an unutterable disgrace, and prove injurious to the island in a very high degree. It is on this account that his Excellency the Governor, in the Government notice which he has issued on the subject, "earnestly invites the co-operation of the inhabitants of Jamaica of all classes in order to secure to the island the full advantage which is offered by so rare an opportunity of giving a world-wide notoriety to its many valuable natural and manufactured productions;" and the Hanover Society of Industry in at once responding to the call of the Governor and of the Royal Society of Arts in this matter, feel that they are only obeying the call of their imperative duty, and they do so with a large measure of confidence, that in this, as in all their previous efforts, they will secure the warm sympathy and efficient assistance of many around them, besides the members of their own Society. They trust, therefore, that the space which may be allotted to them in the Great Exhibition will be so creditably occupied that, even amid the grandeur and multiplicity of the objects with which the Great Palace of Industry will be filled from every part of the wide world, the humble niche of the Hanover Society of Industry will not pass unnoticed by the well-wishers of Jamaica.

The following gentlemen have been appointed to act as London Commissioners for Jamaica:—

Sir Joshua Rowe, K.C.B., late Chief Justice, Thomson Hankey, Esq., M.P., Stephen Cave, Esq., M.P., Mr. William Smith, Mr. William Cunningham Glen, barrister, Mr. Lucas Barrett, F.L.S., F.G.S., Mr. Edward Chitty, and Mr. A. F. Ridgway, agent for Jamaica.

In the island of St. Kitts the following gentlemen have been appointed Commissioners by the Lieut.-Governor:—Messrs. J. Berridge, S. Davis, and Wm. Clukies; but no details of the intentions of the colonists have yet come to hand.

BRITISH GUIANA held its Local Exhibition, of products intended for transmission, on the 28th, which I shall take another opportunity of drawing attention to.

INTERNATIONAL EXHIBITION OF 1862.

FRENCH DEPARTMENT.

The *Moniteur* publishes the following report, addressed to the Emperor by Prince Napoleon, as President of the French Imperial Commission of the Universal Exhibition of 1862:—

"SIRE,—At the time of the Universal Exhibition of Paris in 1855, your Majesty deigned to affix your signature of approval to the regulations prepared by the Imperial Commission. A decree of the 6th of April, 1854, in sanctioning the arrangements contained in that regulation, allowed them to be usefully appealed to in several cases, in order to obtain from the different Ministerial departments the adoption of measures calculated to facilitate the preparatory works of installation. It is thus that a decision of the Minister of Finance, founded on the text of Article 20, exempted from stamp duty the way bills accompanying the packages intended for the Universal Exhibition. The Imperial Commission, charged by your Majesty with the care of organising the French section of the Universal Exhibition of 1862 in London, has inspired itself with your Majesty's liberal ideas, and has thought it just to leave to the account of the State the expense of carriage of all articles intended for that Exhibition, from the railway station nearest to the place of production as far as London, as well as the carriage of them back to France. In presence of so considerable a charge and of the relatively small amount of the credit opened by the law of July 2, 1861, it appears proper that the Imperial Commission should be placed in the position to obtain

from the financial administration all the facilities compatible with the exigencies of the law. The approval of the regulations will, in particular, allow the text of Art. 27 to be acted on, in demanding from the Minister of Finance the exemption from stamp duty granted in 1855. I have, in consequence, the honour of submitting for your Majesty's signature the subjoined decree. Accept, Sire, the homage of the deep and respectful attachment with which I am your Majesty's devoted cousin,

"NAPOLEON (JEROME)."

The *Moniteur* publishes an Imperial decree approving the regulations prepared by the Imperial Commission, of which Prince Napoleon is the president, appointed to organize the French section of the Universal Exhibition of 1862 in London, and which is dated the 15th of June, 1861. The following are the principal regulations:—

"Article 1. The Universal Exhibition of 1862 will be opened in London on the 1st of May.

"2. The communications made by the authorities or by private individuals on the subject of the Exhibition are to be addressed (not prepaid) to the Councillor of State, Secretary-General of the Imperial Commission, at the Palace of Industry, Paris."

The second section of the general regulations indicates the manner in which French produce is to be selected for admission:—

"3. The prefects will appoint the local juries selected to propose the admission of exhibitors and of their produce. They will fix the number of juries in their department and the number of each jury. These jurors are to be chosen from among the persons whose character, general knowledge, and impartiality offer the best guarantee to manufacturers and agriculturists.

"4. The nomination of the juries of admission is to take place without delay. The composition of each jury, as well as the seat and circumscription of its operations, is to be published without delay throughout the department.

"5. The prefects will arrange with the municipal authorities to supply the juries with all that is necessary for their meetings, and for the execution of their duties.

"6. The juries will adopt all measures required for the success of the Exhibition. They will propose to the Imperial Commission the admission of exhibitors; they will preside at the reception and at the despatch of their produce.

"7. Their presidents and their secretaries will correspond directly with the Imperial Commission. The latter forbids all correspondence with the exhibitors on the subject of the admission and despatch of their produce.

"8. Each jury will open lists, on which are to be inscribed the persons who desire to take a part in the Universal Exhibition.

"9. The juries cannot admit a Frenchman to present the produce which he has manufactured in a foreign country, but they may admit a foreigner to propose the articles which he has produced in France.

"10. The juries may inscribe on the lists all industrial produce manufactured since 1850, and all agricultural produce, with the exception of living animals and plants, animal and vegetable matter liable to decomposition, detonating or dangerous substances.

"11. Corrosive acids and salt-spirits, or alcohol oil or essence, and generally bodies easily ignited, cannot be admitted except in vases of solid glass, hermetically closed. Capsules and other articles of the same nature, into which fulminating powder shall not have been introduced, may be admitted.

"12. Among the persons inscribed the juries shall select those who, by the importance or merit of their produce, shall reflect the greatest credit on the French exhibition. They will make their choice on the direct examination of the produce, and, in default of such examination, on an inspection of the patterns, models, or plans, and on public notoriety.

"13. The juries will propose to the Imperial Commission the exhibitors chosen by them. For that purpose they will form lists, according to the model annexed to these regulations. They will take care to mention in these lists the medals obtained by the producers at the Universal Exhibitions of 1851 and 1855. As those rewards are personal, no account will be taken of those which shall have been given to an individual or to a company of which the exhibitor is the heir or the successor.

"15. Producers alone are to be permitted to exhibit. The juries shall ascertain the quality of the person in whose name each production is to be presented. The name of the merchant who orders or habitually sells an article may, with the consent of the producer, be united to the name of the latter. In this case the merchant's address will figure in the catalogue after that of the exhibitor.

"16. The Imperial Commission, assisted by a central jury of revision residing in Paris, will decide on the complaints addressed to it against the decisions of the juries of revision. Every demand upon which a decision shall not have been pronounced by the juries shall be regarded by the Imperial Commission as null.

"17. The Imperial Commission, taking into consideration the proposals of all the juries, and the extent of the space of which it can dispose in London, will indicate to the juries by the 15th of September, at the latest, the persons admitted to the Exhibition of 1862, and the space allotted to each of them.

"18. When the Commission shall confine itself to indicate a jury the entire space reserved for its circumscription, the latter shall divide that space among those admitted to exhibit, according to the nature and to the importance of each exhibitor's produce. In such a case the jury will immediately communicate to the Imperial Commission the result of the allocation."

The third chapter of the regulations arranges the mode of transporting from Paris to London the articles to be exhibited, of which the expense is to be defrayed by the Imperial Commission.

"28. The productions are to be received at the railway terminus from the 20th of February, 1862, to the 10th of March following. After that day the exhibitors will have to defray the cost of the transport. The produce of exhibitors which shall arrive in London after the 31st of March, 1862, may be refused if the commissioners of the Queen of Great Britain shall strictly maintain the last date as the limit of the admissions.

"30. The Palace of the London Exhibition being constituted into a real *entrepot*, the exhibitors shall not have to pay any duty on the entrance of their produce into England. The Imperial Commission takes charge of all communications with the French and English Customs for the expedition of the produce."

The 4th chapter contains the regulations for unpacking and placing the produce in London.

The 5th chapter contains the regulations for the service at the Exhibition of London.

"44. The Imperial Commission will adopt all necessary measures for preserving the articles exhibited from injury, but it is not responsible for accidents by fire or otherwise. It will likewise take care that the articles exhibited shall be watched over by numerous and active agents, but it will not be responsible for any thefts committed.

"45. Every exhibitor may have his property guarded by one or more agents of either sex, whose names shall have been given to the Imperial Commission.

"46. The agents so accredited may answer questions asked by the public, and deliver prospectuses, addresses or prices current; but they shall be forbidden to invite purchasers by word of mouth.

"47. No article exhibited shall be removed from the Palace previous to the closing the exhibition without a special permission in writing from the Commissioners of her Majesty the Queen.

"48. A gratuitous card for entrance shall be delivered to each exhibitor or to his agent.

" 49. Each accredited care-taker shall receive a special card for entrance to the Exhibition.

" 50. Gratuitous cards shall be likewise granted to the members of the central jury of revision, and to the secretaries of the juries of admission present in London during the Exhibition.

" 51. The cards so delivered shall be absolutely personal; and they shall be withdrawn if it shall be ascertained that they have been lent or given to any other person.

" 52. An order of service attached in those parts of the Palace allocated to the French exhibitors will make known the agents appointed by the Imperial Commission to supply useful information, and to afford assistance if necessary."

The 6th chapter regulates the manner in which the produce exhibited is to be withdrawn after the closing of the Exhibition.

The 7th chapter contains the regulations respecting the works of Art to be exhibited.

The 60th article says:—

" That the Imperial Commission will take charge of works of Art at the residence of the artist or proprietor, and they will be returned there by the Commission."

PROPOSED MEMORIALS TO HIS LATE ROYAL HIGHNESS THE PRINCE CONSORT.

The *Times*, in a leader recommending the erection of a monument as a memorial to the late Prince, says:—

" In the present case we feel very sure that, were the nation canvassed, as for a living chief, they would be for a monument in the common sense of the word. Nothing so well expresses a personal sentiment, be it love, or admiration, or reverence, or all in one. As yet there is no memorial of the Prince, except his name to some streets and public places, though he well deserved one for his successful labours in the Great Exhibition. Nor can it be said that the metropolis is overdone with monuments. It has probably fewer than any other city in the world for its importance and size. We possess a hundred sites which elsewhere would have every adornment that architecture and sculpture could contribute, but which have no other decoration but what the speculative builder could afford for the money. Some of our finest streets are totally destitute of national or historical features, and might as well have been laid out in Michigan ten or twelve years ago. Our parks, beautiful as they are, old as they are, peopled as they are with associations, and relieved as their horizon is with distant objects of interest, owe nothing themselves to either architect or sculptor, and are without a single record of the scenes they have witnessed. What, then, better than a monument, such as we all mean by the word? This question is easily answered. But, if we are to judge from the variety of suggestions, it is not so easy to select the particular kind. We have now two lofty pillars, neither of which quite pleases the eye or vindicates the national taste to those who know foreign or antique models. We may depend upon it, a third will be very like the other two. It has been suggested that, as we possess the dimensions and details, and the very sculptures themselves, of the famous "Mausoleum," which was a monument of conjugal affection, we might reproduce it on a suitable site, with the best materials in our power, and the world would not venture to disparage one of its own seven wonders. The answer to this is that reproductions always disappoint. It is invariably found that the original owed much of its charm to circumstances which we cannot reproduce or impart—to the site, the material, the sky, or the subject itself. Perhaps the most practical suggestion is that of an obelisk on the site of the transept of the Crystal Palace in Hyde-park—one of the most open

and conspicuous positions about the metropolis. Except a few dwarf obelisks in freestone at the intersection of streets, a little larger than lamp posts and sometimes answering that purpose, and perhaps we ought to add an eccentric church tower a little south of the City-road, we do not possess a single specimen of that almost universal feature. Yet nothing so entirely satisfies the eye, nothing except a pyramid is so durable, and nothing is so well adapted to the perpetuation of a simple feeling or idea. Whether it would be possible to obtain a monolith equal to the obelisks of Egypt we leave to the engineers, but cannot conceive there would be any difficulty. The shaft of Alexander's column at St. Petersburg is 84 feet long, and the story is that it was cut from a piece 14 feet longer. With the massive base it stands 154 feet high. It was raised to its place within one hour. It is of a red granite, rather darker than our own Peterhead, brought from a quarry 140 miles from St. Petersburg. Granite is the best stone for out-door monuments, and keeps both its texture and its colour in the smoke of London. The Scutari monument shows how easily the stern semi-barbarous character of an obelisk can be combined with classical and religious features. There is not a traveller who does not return from Rome with a regret that London is, it may be said, utterly destitute of an ornament which carries the mind back to the beginning of civilization and history, and harmonizes so well with modern architecture.

" We offer the suggestion in good time, because time is more easily lost than recovered, even for the most welcome propositions. Nobody knows what a flood of exciting incidents may soon turn the attention of the British public far away from the quiet virtues of a palace and the green sward which covers the once glorious transept of the Great Exhibition. It would be well, too, that the proposal were matured and settled before the opening of the new Exhibition, which thus already mourns its founder. If anybody has a better suggestion, we shall be glad to give it fair play; but we have a strong opinion that this is a case for a "monument," and that oneness, simplicity, force, and a universal significance should be its features. Something is wanted that may attract attention and excite curiosity, so that for ages to come the Englishman and the stranger may ask, as we ask concerning the Egyptian obelisks, but to more purpose, who was it that a nation thus commemorated? To be worthy of the Prince Consort, it ought to be on a majestic scale, and an ornament to the metropolis. It will be the first really national tribute of the kind paid to any member of the Brunswick dynasty. We need not go far from home to see the lavish honours and scarcely less than worship shown for the memory of a great soldier, of whom it is hard to say whether he did more good or evil to his country and the world. If Prince Albert did not overthrow empires and overawe continents; if he had not the opportunity of reconstructing the edifice of social order over the ruins of a monarchy, a church, and a nobility, he did at least all the good he could do, and that good singularly unmingled with evil, as it certainly was free from either vanity or ambition. So let us raise the finger that points to heaven to the memory of a man whose aspirations were all high, gentle, and good. Let colossal arches and reproductions of Imperial Rome mark elsewhere the triumphs of war. We will pay our honours to peace, art, science, and the domestic virtues, and we will do it on a scale which shall stand comparison with the most magnificent trophies wrung from a desolated world."

The following letter has been addressed, by permission, to the Right Hon. the Earl Granville, K.G., Lord President of the Council:—

"South Kensington, London, W., Dec. 31, 1861.

"MY LORD,—Among the many suggestions which will doubtless be brought forward for memorials of the great Prince whose loss is deplored not only by his adopted

country, but throughout the world, the project which his Royal Highness always had at heart of promoting industrial progress seems to me worthy of especial attention, as affording, perhaps, the most useful and important mode of perpetuating his memory to all time, and of constantly reminding all classes of his enlarged benevolence and practical wisdom. Having your Lordship's permission, I beg leave to submit for your consideration some observations in order to show how the project might be carried out.

"2. The supplemental charter of the 2nd of December, 1851, granted to the Commissioners of the Exhibition of 1851, empowers them to carry out 'a plan which in its general character should serve to increase the means of industrial education, and extend the influence of science and art upon unproductive industry.'

"3. This was the suggestion of his late Royal Highness the Prince Consort, and it was an aim and aspiration never absent from his mind. The second report of the Commissioners (pp. 40, 41) gives one version of the idea, but others are known to exist, drawn up by the Prince himself in great detail. It was proposed to carry this idea into effect by some combination of the various metropolitan and local institutions which promote industrial science and art, and by the centralisation of some of them in one locality; such centralisation, however, not being an essential part of the project. The chief object was to establish some system of combined action among scientific and artistic institutions which should increase the means of industrial education. This combination would, I conceive, afford a suitable memorial to the late Prince, without superseding other memorials of a monumental character.

"5. It might take the form of an Industrial University, to be known throughout the world as the 'Albert University.' The specific object of the institution would be to grant degrees and honours in those particular sciences and arts which directly influence works of industry.

"6. In the words of the second report, such an University might become 'the centre of a system of local institutions aided by local exertions and association; thus securing to our manufacturing population sound industrial knowledge, while, by confining attention to technical instruction, and not extending it to general education in science and art, such an University would be adding to, without interfering with, the means of instruction already existing in schools and colleges.'

"7. Such an University would differ from the London University in not requiring examination for matriculation, but perhaps accepting examination conducted by other authorities. The degrees and honours would be granted for specific success in subjects technically applied. A miner from Durham or Cornwall might acquire his degree in mining only; a chemist from Manchester, Bristol, Newcastle-on-Tyne, or the Staffordshire Potteries might take honours in chemistry only. So, the agriculturist in agriculture, the builder in construction, and the civil and mechanical engineer in engineering, &c. Degrees might be conferred in the fine arts of architecture, painting, and sculpture when combined with industrial application, and perhaps honour for musical acquirements should be given. The want of an authority to confer honours in mining knowledge has been already recognised by your Lordship.

"8. The management might be confided to a Senate, consisting for the most part of representatives of each of the various institutions proposed to be brought into combination. The members of the University would be those who obtained its degrees and honours, and they might perhaps be considered worthy of having electoral rights.

"9. Each representative of a scientific or artistic institution would be elected annually by his own society.

"10. The Senate, as in other Universities, would name the examiners, whose responsibility would be insured by payment for their services.

"11. The endowment should be partly from public subscriptions and partly from Parliamentary funds.

"12. The site of the proposed University should be at South Kensington.

"13. The working of the institution would be analogous to that of the University of London.

"14. The institution would undertake no direct instruction. It would not interfere with the various existing modes of instruction or management of institutions, but would simply ascertain and record results, and confer honours in respect of them.

"15. A charter of incorporation would be necessary.

"16. Without troubling your Lordship with further details at present, and trusting that sufficient has been said to show how his Royal Highness's project might be easily carried out,

"I have the honour to be, my Lord,

"Always your Lordship's faithful servant,

"HENRY COLE.

"The Earl Granville, K.G., &c."

The following letter has been addressed to the Secretary of the Society of Arts:—

SIR,—“A light is passed from the revolving year,” and in the quiet contemplation which ever grows out of the serene sadness of those dim hours which follow the painful moments when dust is rendered back to dust, we ask ourselves what memorial shall we raise to mark our appreciation of the virtues of our departed friend.

The latent goodness which lives in every human heart, that spark of truth which cannot be crushed out of the soul of man, howsoever great may be the burthen of vice beneath which it lies buried, is ever and anon asserting its existence, by paying its tribute to the holiness of virtue.

Hero-worship is but an outward manifestation of that inward feeling which compels all men to acknowledge the sovereignty of goodness,—using that term to embody the many traits which distinguish the benefactors of their race. That desire to possess the image of a departed friend, which is equally strong in the breast of the mendicant as it is in that of the monarch, and which in every age and clime has displayed its power, is one of those virtues which cannot be annihilated, and which proves “the Heavenly origin of human love.”

A people united in the bonds of a common sorrow inquire what memorial shall we raise which shall perpetuate the memory of the Prince whom we have lost for ever? The first idea is the common one—we desire to possess his likeness—and statues of the Prince Consort will decorate many towns of the British isles, and our children's children will thus be made familiar with his face and form. But while we thus create, as it were, the material outness of the good man whom we have lost, is it not possible to give a living reality to his thoughts which we have not lost, and to mould a form which, when quickened by the ideas promulgated from time to time by the Prince Consort, will become a ruling intellectual Power in the land? I turn to the collection of speeches and addresses of H.R.H. the Prince Albert, and they inform me that the dominant idea in his fine mind was “the realisation of the unity of mankind.”

The following elegant paragraphs beautifully express important truths:—

“Man is approaching a more complete fulfilment of that great and sacred mission which he has to perform in this world. His reason being created after the image of God, he has to use it to discover the laws by which the Almighty governs his creation, and, by making these laws his standard of action, to conquer nature to his use, himself a divine instrument.

“Science discovers these laws of power, motion, and transformation; industry applies them to raw matter, which the earth yields in abundance, but which becomes valuable only by knowledge.

“Art teaches us the immutable laws of beauty and symmetry, and gives to our productions forms in accordance with them.”

Whenever the occasion presented itself, the Prince Consort never failed to express his desire that the amelioration

rating powers of science should be extended to places where ignorance, and consequently superstition, still hold rule, and that the sweet amenities of art should exert their refining influences throughout the world.

These were his ever present thoughts, and when the question of a "Memorial of the Great Exhibition" was submitted to the Prince, we find the following reply:—

"It might, probably, be done by the endowment of one or more professorships, by the institution of periodical exhibitions, by the purchase of fine works of art for the national museums, or by the endowment of prizes for specific objects. But that which strikes his Royal Highness, at this moment, as the simplest and most effectual method, would be to found scholarships, as prizes for proficiency in certain branches of study connected with art and science. * * * * * The competition for such prizes, as being immediately connected with the objects of the Great Exhibition, might, if so wished, be conducted under the auspices of the Royal Commissioners, who might meet publicly each year, on the anniversary of the opening of the Exhibition, to announce the successful competitors, when the reports of the preceeding year, which the scholars might be instructed to furnish, might also be read, and their publication for general use afterwards undertaken by the Commissioners."

Mr. Henry Cole having addressed a letter to the Earl Granville on the establishment of an Industrial University, which it is proposed shall embody the suggestions of his late Royal Highness, it may appear that I am guilty of presumption in offering these remarks. If so, allow me to presume yet further, and use the words of the Prince as my apology.—"I conceive it to be the duty of every educated person, closely to watch and study the time in which he lives, and, as far as in him lies, to add his humble mite of individual exertion to further the accomplishment of what he believes providence to have ordained."

In 1840 I became the Secretary of the Royal Cornwall Polytechnic Society, which still lives in vigour, doing its excellent work of rewarding annually every meritorious effort of human thought and human industry which may be submitted to its judges. From that time to the present moment, I have been intimately connected with, what I will call, the People's Institutions throughout the land. Hence, I venture to offer some suggestions which occur to me, these being the result of a full knowledge of the state of our popular institutions. I have worked with them when flourishing as educational establishments, and I have grieved when I have seen them yielding to that race for popularity which has made them rivals of the concert room and the theatre.

A large number of the Institutions in Union with the Society of Arts—perhaps all—are most desirous of returning to the path from whence they have deviated. They have fed their members with stimulating food so long, that they complain if a less exciting but more healthful diet is offered to them, and cease to subscribe; consequently, to maintain their position, the Institutions are compelled to persevere in that career which is fatal to their permanent existence.

To render effective the "Albert University," which Mr. Cole, with the Royal Commissioners, thinks "might become the centre of a system of local Institutions, aided by local exertions and association," it is essential that the institutions of the people, by whatever name they may be known, should be reorganised. A new educational system must be introduced amongst them. The difficulties are many—the progress may be slow—in some places the opposition will be keen, but any effort made with a single-ness of purpose towards the diffusion of sound information on nature's works and nature's laws, and the cultivation of a knowledge of the beautiful, must eventually succeed.

I cannot pretend to offer any suggestions at present relative to the methods by which this idea may be carried out. The Society of Arts has already published a "Re-

port on Industrial Instruction." Many valuable thoughts occur therein, but hitherto they have been barren of results.

I would urge upon all the importance of making our great memorial of the departed Prince a realisation of his leading thought. To do this effectively, aid must be given to all those Institutions which desire to work for the benefit of the localities in which they are placed, and an earnest effort must be made to restore to all an educational system, using that term in its most liberal, its most extended acceptation. Then the Senate of the contemplated University of Industrial Science, when they "met publicly each year, on the anniversary of the opening of the Exhibition," might really proclaim that they were working out that idea of the Prince Consort which promises to lead to "the realisation of the unity of mankind."

I am, &c.,

ROBERT HUNT.

STEAM TELEGRAPHIC AND FOG SIGNALS.

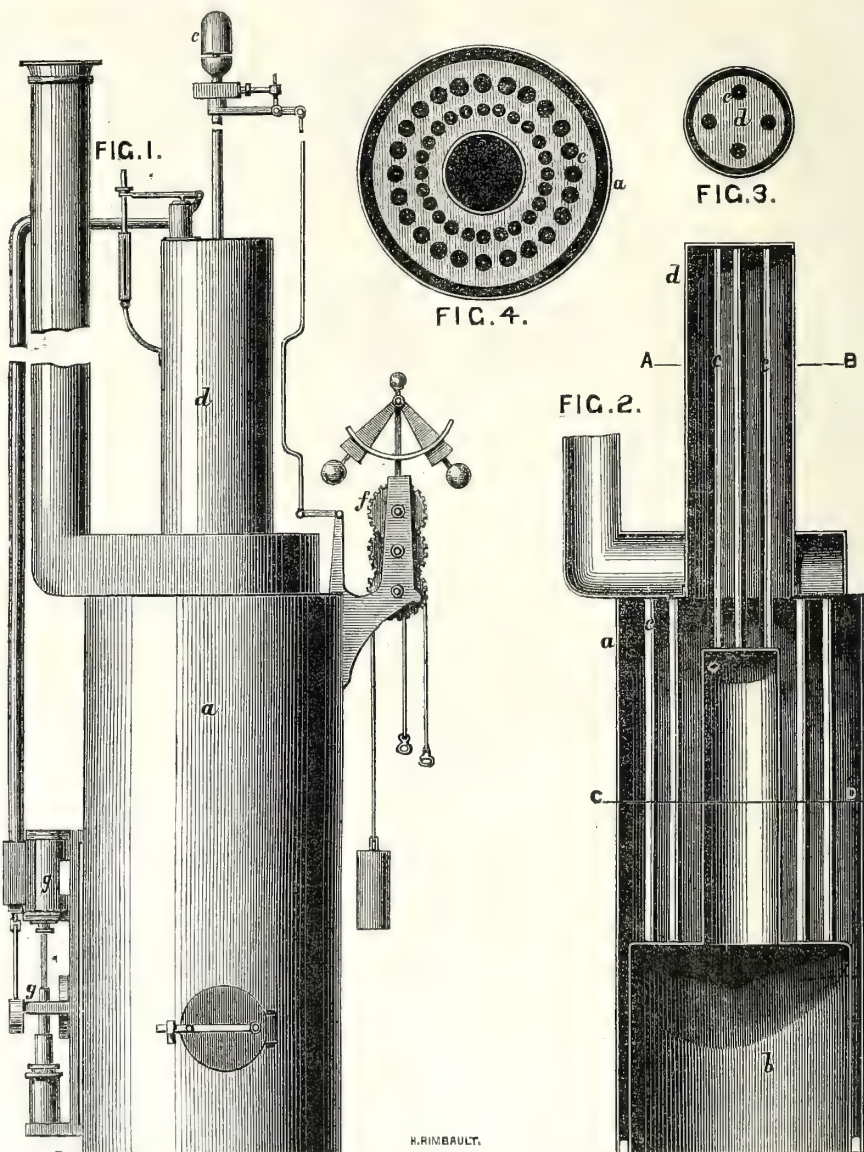
The system of signalling, described below, is invented by Mr. Delabere Barker, and is principally intended for communicating signals in foggy and other weather from the land to vessels at sea, but is also applicable for use in signalling on board vessels, and on railways, and to and from railway trains, as well as for other purposes.

The apparatus for signalling from the land to vessels at sea, and for other purposes where a stationary apparatus is used, consists of a steam boiler or superheating apparatus suitable for generating steam to a very high pressure; that which has been found most suitable for the purpose is a small vertical tubular boiler surmounted by a high steam chest, into which some of the fire-tubes from the furnace are carried for the purpose of superheating the steam therein to a pressure of about 150 lbs. on the square inch. Connected with a steam pipe from the said boiler is a powerful steam whistle or whistles for signalling, and the said whistle is furnished with a sound reflector and conducting tube or tubes for concentrating and directing the sound of the whistle in any required direction. The whistle is operated upon by means of a suitable automatic apparatus connected to the boiler, which opens the valves for sounding it at regulated periods; the apparatus to be wound up every hour, and furnished with a movement to enable it to work while it is being wound up. The boiler is fitted up with a pump and the necessary apparatus for supplying it with water. By using more than one whistle, sounding different notes on the same apparatus, an identity may be given to the locality in which the apparatus is placed, for example, a 6-in., 5½-in., and a 5-in. whistle, each sounding alternately and forming a chord, may be gone over exactly in a minute of time, and forms a suitable arrangement with a distinct musical cadence for signalling from the land to vessels out at sea; the name of the place at which the apparatus is fixed thus serving the purpose of a lighthouse in the densest fog, or by means of a properly arranged code of signals, telegraphic communications of much greater length may be sent, not only in signalling out to sea, but in signalling between vessels at sea, or from one fixed station to another, as may be desired.

On rocks and prominent headlands, where light-houses and beacons are deemed essential to the safety of the maritime and commercial interests, these signals are said to be capable of identifying the rock or headland with the utmost clearness and certainty to all vessels on the sea, in the densest fog and in the wildest storm, to a considerable distance, varying from six to twelve miles in any one direction required, and maintained at an expense about one-half of the lights now in use. The signals may be used between two vessels when meeting, being easily exchangeable to a distance of five miles, at the rate of about ten syllables in a minute. The news-press of New York, for instance, expends from £1,000 to £1,500 per annum in intercepting the mail

steamers, a service most imperfectly performed by yachts; through the medium of these signals this could be accomplished by the steamers themselves with certainty, in passing the different points where the news vessels are now stationed. In using the apparatus on board a vessel the most suitable position to place it is on the fore-castle

with a sound reflector or reflectors behind the whistle to reflect the sound, with a tube or tubes to direct the sound in advance, and in a measure shield the passengers from the annoyance hitherto experienced when steam whistles have been used. The reflector and tube may be united, if deemed desirable.



In the illustrations, Fig. 1 is an elevation of a super-heating boiler fitted with apparatus according to the invention; Fig. 2 is a vertical section of the boiler; Fig. 3 is a section in plan on the line A, B; and Fig. 4 section on the line C, D. *a* is the boiler shell, *b* is the furnace; *c* is the fire-tube; *d* is the steam-chest; *e* is the whistle (the reflector and conducting tubes not being shown); *f* is the automatic apparatus operating on the valves for sounding the whistle; and *g* is the feed-pump apparatus.

One of these signals has been for some time in use at the Partridge Island Light-house Station, at the entrance to the harbour of St. John, New Brunswick, and the strongest

testimony has been given of its efficiency. The following is an extract from a notice to mariners issued by the Admiralty:—

“In order to warn vessels of danger when approaching Partridge Island, near St. John, in the Bay of Fundy, a steam-whistle has been fitted at the light-house on that island, and will be used during fog. The shrill sound of this whistle once a minute having been heard from a position eight miles to windward of it, has proved the efficiency and utility of this addition.”

A company is being established for carrying out this invention, and they propose to erect one of these signals,

in the first instance, at some light-house station on the English coast, and to bring it immediately under the notice of the Trinity Board. Application has been already made for this purpose, and it is not improbable that Dungeness will be the point selected for the first trial. For its introduction to the notice of the railway companies a similar arrangement will in all probability be carried out.

A portion of the patent has been applied to the ordinary signal now in general use on the railway locomotive, so as to concentrate the sound and throw it in the only one direction required, with the view of sparing the passengers and surrounding neighbourhoods the great annoyance they are now compelled to tolerate.

CÆSIUM AND RUBIDIUM.

These are the names of the new metals discovered by spectrum analysis by MM. Bunsen and Kirchhoff. The Academy of Sciences has received a communication from M. Grandeau, who states that he has had the advantage of making his researches almost under the eyes of M. Bunsen. M. Grandeau began by examining the various mineral waters and minerals, presenting some analogy with the waters of Durkheim, which have yielded cæsium, and with the lepidolite of Rozena, from which the illustrious chemist of Heidelberg has extracted rubidium. The mother waters of the salt-pits of the basin of the Meurthe, of the Mediterranean, the Ocean, the Dead Sea, and the mineral waters of Bourbonne-les-Bains and Vichy were successively subjected to analysis. Sea water and the salt water of the Meurthe only yielded lithia; that of the Dead Sea lithia and strontian; but the waters of Vichy, of which several thousand litres had to be evaporated, yielded about two grammes of the double chloride of platinum and cæsium, and another of platinum and rubidium, the proportion of which was not ascertained. The quantity of the new metals contained in the waters of Vichy is, therefore, very small; but forty hectolitres of the waters of Bourbonne-les-bains yielded, besides chloride of sodium, various calcareous salts and lithia, a considerable quantity of the chlorides of cæsium and rubidium. Some years ago M. Troost had prepared several kilogrammes of salts of lithia, and preserved all the residues. These, examined by M. Grandeau, furnished him with a considerable quantity of a mixture of the two metals in nearly equal proportions. The same result was obtained from a lepidolite of Prague, infinitely richer in cæsium than that of Rozena. Lastly, among the artificial productions examined by M. Grandeau, there were the residues of the saltpetre manufactory of Paris. From these Captain Caron had extracted a salt of platinum, in which considerable quantities of the new metals were discovered by M. Grandeau in equal proportions. The refuse of a Belgian saltpetre manufactory contained much rubidium without a trace of cæsium. From all this it would appear that the two new elements are much more widely diffused through nature than was previously suspected.

FINE ARTS IN IRELAND.—TAYLOR PRIZES AND SCHOLARSHIPS.*

The following Prizes are offered for the year 1862, and are open to Art Students of Irish birth or attending a School of Art in Ireland, to be awarded at an Exhibition to be held on the 10th November, 1862, at the house of the Royal Dublin Society:—

1. For the best Picture in Oil Colours, the subject historical or familiar, containing at least three figures to a scale of three feet; the Scholarship of £40
2. For the best Landscape in Oil Colours, the prize of £20

To be increased or lowered in amount, or wholly withheld, according to the merit of the works.

* See *Journal*, Vol. IX., p. 112.

held, according to the merit of the works. The Scholarship may be held for a second and third year, provided a work of adequate merit be produced in each year.

All works must be delivered before two o'clock on Saturday, 1st November, 1862, at the house of the Royal Dublin Society, Kildare-street, Dublin, where the conditions and other particulars may be ascertained.

PARLIAMENTARY RESPONSIBILITY AND NATIONAL MUSEUMS.

The *Athenæum* says:—"The importance of consolidating and improving the management of the British Museum, by making it more responsible, has often been discussed in these columns, and there seems some likelihood of the views we have several times expressed at last being realised. It has hitherto escaped public notice that at the end of last session of Parliament, Lord Henry Lennox, who had made himself master of the National Gallery question, and successfully prevented further expenditure in temporary patch-work of the edifice, gave notice of his intention to bring before the House of Commons the importance of ensuring a Parliamentary responsibility for the expenditure of public money hitherto entrusted to trustees of various institutions. He specified in his notice the British Museum, where Parliament contributes about seventy times the amount which the Trustees hold as a private corporation; also, the National Gallery, where the management is divided between the Treasury and the Trustees; also, the National Portrait-Gallery, where the same system obtains. The year of the International Exhibition is particularly appropriate for the discussion of subjects of Science and art, and it is to be hoped that the House will apply some remedy to our present system. The first step in any reform is to ensure the greatest responsibility, and in the words of John Stuart Mill, make it 'apparent to all the world who did everything, and through whose default anything was left undone.'"

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(Continued from page 103.)

THE PRESENT STATE OF SEVILLE.—Seville (says Mr. Consul Williams) is situated principally on the left bank of the River Guadalquivir, about fifty-four English miles from the sea; the navigation is perfectly safe, except in time of inundations, there being no rock in the whole course of the river. The water is sufficiently deep for any kind of vessels, except on passing three sand-banks, which might easily be removed; but in their present neglected state cannot be passed with more than ten-and-a-half feet of water, even at spring tides, so that the far greater number of vessels have to be lightened at a place called the New Cut, about sixteen miles below, to enable them to come up abreast of the town. The port or part of the river usually occupied by the shipping will contain about 100 sail of vessels, but the mole is not of a sufficient extent for the present augmented state of trade, consequently ships are obliged to lay along the banks of the river to take in their cargoes.

A plan has been formed which has been sanctioned by the Spanish Government, for improving the state of the river, of which the principal works in contemplation are the continuation of the mole from its present limits along the bank as far as the iron bridge, which will augment its extent by about 600 yards, and the cutting of a new channel through two distinct points where the river makes a very winding turn, forcing it to take a direct course, which will shorten the distance by at least seven miles, and leave out two sand-banks. The remaining sand-bank is to be removed by a dredging machine, brought from England, which is now nearly completed, and will soon commence working.

The Guadalquivir is only navigable above the bridge for flat-bottomed boats, which are principally employed in bringing coals from the mines of Villanueva, a place about six leagues from Seville, but the coals are of a quality only to be used by the blacksmiths. The steamers and steam engines cannot work without English coals.

On arrival at Seville from St. Lucar, the city is nearly concealed from the view, as it is built on a part of that immense plain which extends from Cordova nearly to the sea. The principal objects seen on the left bank are the cathedral and the palace and gardens of the Dukes of Montpensier, and on the right the suburb of Triana; the iron bridge, seen in the distance, which is of modern construction, occupies precisely the same place as the old bridge of boats which had subsisted from the time of the Moors. The place is surrounded by Moorish tapia walls, extending about four English miles, in general well preserved, and in some parts quite perfect. On the outside of these walls are rows of trees and walks which make the entire circle, and are a great comfort to those who have to move about during the heat of the day.

Besides the space within the walls, the city has acquired considerable extent on the outside, comprehending the suburbs of Triana, San Benardo, La Calzada, La Macarena, and Los Humeros. The streets are very irregular, having undergone scarcely any alteration in their ground plan since the time of the Moors, but the place is fast losing its Moorish character owing to the many new buildings and improvements. No place in Spain can boast of so many fine public buildings, and it may be calculated that a quarter of the ground inside the walls is occupied by churches, convents, hospitals, and Government establishments. The cathedral is undoubtedly the finest in Spain. Seville is the see of an archbishop, the residence of the Captain-General of the Fourth Military District, comprehending the provinces of the same name, Cordova, Huelva, and Cadiz; the seat of the Audiencia, or Superior Court of Justice of the same district, and the University. There are two public libraries, an Academy of the Fine Arts, and several colleges and other places of public instruction. The Government establishments, besides the Royal Palace, are the Cannon Foundry, the Military Arsenal, the manufactory of muskets and percussion caps, the cigar and snuff manufactory, the Mint, the Lonja (or archives of the colonies), and the quicksilver stores. These establishments give occupation generally to about 6,000 persons, which is a great advantage to the place. The population is at least 130,000 persons, but no exact census has ever been taken. Seville has augmented greatly in riches and trade during the last twenty years, which may be partly attributed to the constant immigration of opulent mercantile houses from South America. Landed property and dwelling-houses have doubled their value during the same period, which I consider the natural consequence of the increase of capital and speculation, and the prosperous state of this part of Spain.

The manufacture of silks is carried on here to a great extent, and though not equal to the French in the superior kinds, they rival those of Valencia, and serve to supply great part of the south of Spain and Estremadura. The manufacture of all kinds of coarse linen is also very considerable, and has completely excluded the English and German linens, with the exception of the very superior classes. But these are entirely dependent on their supplies of English yarns, and in case of a war would be at an end. Soap is also made here in great perfection for common purposes, and this place supplies with that article great part of Spain, and considerable shipments are made for the Havana and South America. There are also manufactories of coarse woollens and sacking; of horn and tortoise-shell combs, and some kinds of inferior hardware. Two potteries have been established by British subjects. That of Messrs. Pickman and Co., which is of some years' standing, has made great progress, and supplies

great part of Spain with earthenware, though inferior in quality to the English. They employ about 400 persons. The other has scarcely made a commencement. These potteries are also dependent on England for their supplies of clay and ground flint. Four iron foundries have been established (though on a small scale), which are actively employed in casting for the railroads and mining districts.

There is at present a great rage for mining. Besides the famous quicksilver mines of Almaden, which are monopolised by the Government, there are numerous mines now at work. The iron mines of Pedroso are making great progress, and produce an immense quantity of iron, and of a very good quality; but the want of machinery to give it a convenient form prevents its being applied, except for certain purposes of the coarser kind, consequently a supply of English iron is required. The lead mines begin to produce large quantities of that metal, the greater part of which is exported for France and England. Besides the copper mines, copper is produced in abundance in a rivulet called Rio-Tinto. Besides the Government establishment, a number of private individuals have established themselves in the vicinity, and take advantage of the same waters; and having been very successful, they have exported large quantities of that article and have increased the importation of English pig iron, which they require to immerse in the water. There are also silver mines, but these have not yet had the same success. The want of good roads is a great drawback to these mining establishments, for, with the exception of the turnpike roads from Seville to Madrid and Cadiz, and from Seville to Badajoz, all the others are as bad as those in Barbary. With good roads, Seville might be amply supplied with timber of all kinds; but in their present state the numerous oaks, chesnut, and pine-woods within the distance of fifteen or twenty leagues are of no avail, and nearly all the timber required is obliged to be imported from Russia, Sweden, and Norway. The projected railroads, when carried into effect, will remedy the evil. That from Madrid to Badajoz, Cordova, and Seville, passing through the coal mines of Belmez and Espiel, in the Sierra de Cordova, will render those mines available, and enable the coal, as well as all the produce of Estremadura to be brought down at a reasonable expense. The part from Cordova to Seville is making progress, and now employs about 6,000 workmen; the first seven leagues, which extend from Seville to Lora, are to be opened in all shortly, and will be a great advantage to the mines of Pedroso, Villanueva, and many others situated in that direction. The railroad from Seville to Cadiz is also advancing rapidly, and is engaged to be finished in two years.

The soil in both the provinces of Seville and Cordova is very rich, particularly the plains of the Guadalquivir, and there is scarce any part that cannot be rendered available for some purpose or other. I calculate that full one-half of the land in these provinces is uncultivated, and only serves for pasture ground for the numerous herds of cattle of all kinds that abound in this part of the country. One quarter is occupied by the olive plantations, and the remaining quarter applied to the sowing of corn and grain, which is always the best land. The uncultivated is, in many districts, completely covered with oaks (of which there are three different kinds), chesnut trees, elms, wild olive trees, and many others; but the greatest extent is of pine wood, which tree thrives in the light sandy soil. The most important branch of agricultural produce I consider to be oil, which is obtained to such an extent as not only to supply the wants of the population, who consume a very large quantity, particularly among the lower classes, who may be said to live on bread and oil, but to export all that is required for Biscay and the northern provinces, and a considerable portion for Cataluna and the eastern coast of Spain, as well as for Marseilles, England, Russia, and the Spanish colonies. Of wheat I calculate that one-half the quantity produced is sufficient for the home consumption, which is also the case with Estre-

madura. This accounts for the great quantity exported from Seville, particularly coastwards. Barley is not grown to that extent, consequently no great quantity is exported. Beans, and all the other kinds of grain, are produced in very great abundance, and considerable quantities are exported for other parts of Spain. The orange groves are very numerous and productive, and there are on an average about one hundred vessels loaded yearly for England and other countries, besides the immense quantities consumed in the country. Chesnuts, which are very fine and abundant, cannot be exported at their present price from the north of Spain, owing to the expense of land carriage. Cork is brought down from Estremadura in great abundance, and is chiefly shipped for England. Wool is still an article of great importance, but the importation for England is very much diminished, and the greater portion is consumed in this country. The export trade has augmented considerably, and will be much greater as soon as the railroads are made, so as to bring down the produce of the interior provinces.

The imports are woollens, linens, and cottons (of the superior classes), linen yarns, hardware, tin plates and iron, earthenware, drugs, machinery, and implements for the railroads and mines, coals, clay, and ground flint, codfish, timber, and many other articles not easily to be enumerated, which are required not only for the supply of this province, but also for Estremadura and the interior.

I ought to have stated that our communications with Cadiz and St. Lucar are kept up by three steamers, which are constantly going and coming with passengers, and another with passengers and goods goes to Gibraltar and back, touching at Cadiz.

The augmentation of the number of British subjects residing in Seville and its neighbourhood, had rendered it absolutely necessary to establish a Protestant cemetery, for which purpose a piece of ground of about four acres has been purchased adjoining to the Garden of St. Jerome, about a mile from the walls on the north extremity of the city, which is in a great part inclosed by walls. The expense has been defrayed by the subscriptions of British residents, and it is to be hoped that we shall be enabled to complete the enclosure by further subscriptions.

Home Correspondence.

OIL OR OTTO OF PIMENTO.

SIR,—In reference to the communication by Dr. Bowerbank, which appeared in No. 474 of the *Journal*, respecting oil, properly "otto," of pimento, I should be glad to make a few remarks. Dr. Bowerbank appears to infer that "money might be made" in Jamaica, by the "industrious man in humble circumstances" having "a small still and a kitchen fire," in procuring the odour of the pimento in a separate state. Believing this profit to be a delusion, and that such labour would be in vain, I now give my reasons.

Otto of pimento is an analogue of otto of cloves, so much so that, to use Dr. Bowerbank's words, "it is employed to adulterate the latter."

In a gamut of odours, perfumers would consider pimento as one octave higher than the note clove. In a mercantile sense, perfumery factors are the only consumers of these odours, about 5,000 lbs. of otto of cloves being consumed by them every year for scenting soap, &c.

One hundred weight of cloves will yield by distillation, on an average, 18 lbs. of the otto of cloves, the present market value of which is 3s. 6d. per lb. Now, as Dr. Bowerbank shows, pimento yields less than 6 lbs. of otto to one hundred weight, this intrinsically is not worth more to the perfumer than clove, although it is now quoted at 16s. per lb., for this high price is caused by there being so little yield and so little demand; but if a quantity was brought into the market, its price would range with clove,

or even lower; and it is admitted here that this class of ottos do not pay interest of capital for the outlay necessary in their production. It is known that the Dutch now and then burn whole forests of clove trees, for the purpose of maintaining the present value. With what hope of success, therefore, could pimento be cast upon the market?

Jamaica, however, has natural resources and materials which perfumery factors much desire to possess; thus, oil of ben or behn, yielded by the *Maringa*, which is a naturalised tree of Jamaica, is one of these. Otto of jasmín, from the *Jasmin grandiflora*, ottos from *Plumeria alba* and *ruba*, and numerous other flowers, which now "waste their fragrance in the desert air," would be of great value—say, at least, 20s. an ounce for the last named.

It should be known to our foreign consuls and to others interested, that there is a want, among perfumery factors, of the products from flowers such as are rare here, but that we are not in want of any kinds of spice odours, that market being amply supplied.

I am, &c.,
G. W. SEPTIMUS PIESSE.

MEETINGS FOR THE ENSUING WEEK.

- MON. Geographical, 8½. 1. Mr. F. J. Monat, M.D., &c., "Narrative of an Expedition to the Andaman Islands, in 1857." 2. Mr. A. R. Wallace, "On the Trade of the Eastern Archipelago with New Guinea and its Islands."
- MEDICAL, 7½. Special General Meeting. 8½. Dr. S. Fenwick, "Desquamative Gastritis in Scarlatina."
- TUES. ... Civil Engineers, 8. 1. Address on taking the chair, by Mr. John Hawkshaw, President. 2. Renewed Discussion upon Mr. Bailey Denton's Paper, "On the Discharge from Under-drainage, and its effect upon the Arterial Channels and Outfalls of the Country."
- ETHNOLOGICAL, 8.
MEDICAL AND CHIRURGICAL, 8½.
SYRO-EGYPTIAN, 7½. Mr. John Hoskyn Abrahall, "Over Lebanon and Back in the Snow."
- ZOOLOGICAL, 9.
ROYAL INST., 8. Professor Tyndall, "On the Transmission of Heat through Gases."
- WED. ... Society of Arts, 8. Mr. Blanchard Jerrold, "Comparison of the Year 1851 with the Year 1861."
- LONDON INST., 7.
METEOROLOGICAL, 7.
- THURS. ... Royal, 8½.
ANTIQUARIES, 8½.
LINNEAN, 8. 1. Dr. Hooker, "On *Welwitschia mirabilis*." 2. Mr. Benthall, "On *Inocarpus*." 3. Dr. Harvey, "On *Alga* collected by Dr. Lyall at Vancouver's Island, &c."
- CHEMICAL, 8. 1. Dr. Bence Jones, "On Hippuric and Uric Acids in Healthy Urine." 2. Mr. George F. Radwell, "On the Solubility of Sulphate of Lead in Nitric and Hydrochloric Acids." 3. Dr. H. Muller, "On a New Mode of Effecting Chlorine Substitutions."
- NUMISMATIC, 7.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, January 3rd, 1862.]

- Dated 26th August, 1861.
2120. R. W. Jones, Cork—Imp. in heating and ventilating, especially applicable to Turkish baths.
- Dated 12th September, 1861.
2267. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved combination of machinery for the production of Valenciennes, Chantilly, Brussels, and other similar laces. (A com.)
- Dated 14th September, 1861.
2293. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved apparatus for the conveyance of medicinal substances into various parts of the human body.
- Dated 21st September, 1861.
2362. C. Board, Bristol—Imp. in veneering presses.
- Dated 4th December, 1861.
3042. R. Kennedy and J. Armstrong, Lisburn, Ireland—An improved arrangement of driving gear.
- Dated 5th December, 1861.
3047. A. T. Carr, Carlisle-street, Soho—The addition to horses' shoes of certain material to prevent slipping.
3050. J. Wilson, Glasgow—Imp. in frames used for displaying trade show cards, pictures, or other similar devices.
- Dated 6th December, 1861.
3056. E. D. Seely, T. F. Wells, and G. A. Phillips, Norfolk, Massachusetts, U.S.—An improved apparatus for holding and placing percussion caps on fire-arms.

Dated 10th December, 1861.

3092. W. F. Stanley, 3, Great Turnstile, Holborn—The use of aluminium for the construction of mathematical instruments used for geometrical drawing, surveying, and nautical purposes, and imps. connected therewith.

Dated 11th December, 1861.

3105. J. Schloss, Cannon-street—An imp. in forming the leaves of albums and books for containing photographic portraits and views. (A com.)
3107. R. A. Brooman, 166, Fleet-street—Imp. in decorating or printing upon china, porcelain, earthen and other like wares. (A com.)
3109. J. Potter, Leeds—An improved mode of jointing or connecting telegraph wires, which is also applicable to jointing or connecting signal wires, fencing wires, and other wires or rods.

Dated 12th December, 1861.

3111. R. Searle, Woodford Wells, Essex—Imp. in the treatment, preparation, and combination of metals used for sheathing ships and marine erections, also for roofing buildings and other purposes.
3114. W. W. Godfrey, 52, Whiskin-street, Clerkenwell—An improved fastener or protector for Albert guards.
3115. W. E. Wilecy, 34, Great Hampton-street, Birmingham—An imp. or imps. in pencil cases and holders for crayons and other solid writing or marking materials, which imp. or imps. may also be applied to crochet needle holders.
3116. R. Mushet, Coleford, Gloucestershire—An imp. or imps. in the manufacture of iron and puddled steel.
3117. W. S. Longridge, Alderwasley Iron Works, Derbyshire—Imp. in railway wheels and tyres.
3118. A. Tonnar, Eupen (Rhenish Prussia)—Imp. in the method of, and apparatus for, drying and cleansing malt as well as any other species of grain and seed intended for brewing, distilling, and agricultural purposes.
3119. J. W. Scott, Worcester—Imp. in wads for fire-arms.
3120. J. D. Jobin, South Island-place, Clapham-road, Surrey—Imp. in locomotive engines, parts of which imps. are also applicable to marine and stationary engines.
3121. H. Bailey, Trump-street, Cheapside—An improved button or stud.

Dated 13th December, 1861.

3122. R. Ashworth, G. Shepherd, J. Cormack, and J. Dearden, Stacksteads, Lancashire—Imp. in looms for weaving.
3124. W. Bell, Leamington—Imp. in kitcheners or cooking ranges.
3125. F. Brampton, Birmingham—An imp. or imps. in the manufacture of the middle joints of measuring rules.
3126. H. J. Olding, Smith-square, Westminster—Imp. in the mode of, and apparatus for, feeding steam boilers, also in apparatus for supplying fluids, for other purposes, and in apparatus for raising fluids.
3127. E. C. B. de Beaulieu, Avallon, France—Imp. in the manufacture of spirituous liquors, and in apparatus employed therein.
3128. G. Bird, Glasgow—An improved grease for lubricating frictional surfaces.
3130. T. Walker, Birmingham—Imp. in means or apparatus for indicating the speed of vessels, and for taking soundings.
3135. A. V. Newton, 66, Chancery-lane—An improved arrangement of fire escape. (A com.)
3136. J. Hetherington, Manchester, T. Webb, Smallwood Manor, Uttoxeter, and J. Craig, Tutbury, Staffordshire—Imp. in machinery or apparatus for spinning and doubling cotton and other fibrous materials.
3137. H. Appleby, 4, Tavistock-place, Plumstead-common, Kent, and H. Harrison, Grand Junction Works, Northampton—Imp. in machinery for boring wood and other materials used in the manufacture of brooms and brushes.
3138. T. K. Adkins, Wallingford, Berkshire, and J. Bonthron, 106, Regent-street—Imp. in the manufacture of starch and in apparatus employed therein.
3139. J. Kelly, Brook-lodge, Roscommon—Imp. in the treatment of milk for the manufacture of butter, and in apparatus for the same.
3141. R. A. Brooman, 166, Fleet-street—Imp. in blowers or apparatuses for superheating steam and other gases, and for projecting them combined with atmospheric air upon ignited combustible matter.

Dated 14th December, 1861.

3143. J. E. Duyck, Tutsham Mills, West Farleigh, Kent—Imp. in the expression of oil from cake and seeds, and in apparatuses employed therein.
3146. W. R. Rogers, Gray's-inn-road—An improved mode of constructing dovetail joints.
3147. W. E. Debenham, The Terrace, Kensington-gardens-square—An improved plate holder for photographic purposes.
3148. W. Husband, Hayle, Cornwall—An improved water safety valve.
3149. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in railway rolling stock. (A com.)

Dated 16th December, 1861.

3151. J. Willis, jun., Newcastle-on-Tyne—Imp. in the preparation of materials applicable to the manufacture of paper.
3153. G. Davies, 1, Serle-street, Lincoln's-inn-fields—Imp. in the manufacture of textile materials. (A com.)
3154. W. Bartram and W. S. Harwood, Sheffield—An improved apparatus for filling and ramming cartridges for breech-loading and other fire-arms.
3155. D. Chalmers, Glasgow—Imp. in looms for weaving, and in the manufacture of cloth therefrom.
3157. W. G. Laws, Tynemouth—Imp. in railway point signals.

Dated 17th December, 1861.

3161. J. B. Bunney and T. Wright, Birmingham—Imp. in ornamenting metallic and non-metallic bedsteads, and other articles made principally of metallic rods or tubes.
3162. R. Shaw, Marple, Cheshire—Certain imp. in carding engines.
3164. A. V. Newton, 66, Chancery-lane—Improved hoisting apparatus. (A com.)

Dated 18th December, 1861.

3166. R. Scott, 29, Great Portland-street—An improved method of rifling or grooving the barrels of fire-arms and ordnance.
3168. J. Perrin, Hyde, Cheshire—An improved equilibrium valve.
3170. W. Dicey, Waltham Abbey, Essex—Imp. in submarine electric telegraphic cables.
3172. M. Hanff, Tottenham-street, Tottenham Court-road—Imp. in the manufacture of boxes and cases.
3174. J. Thiebaut, Mile-end, Middlesex—Imp. in the ornamentation of textile fabrics.
3176. E. Pace, Queen-street—An improved lath for Venetian blinds.
3178. J. Bannehr, High-street, Exeter—Imp. in apparatus for desiccating grain, seeds, and other articles.

Dated 19th December, 1861.

3180. W. Betts, Wharf-road, City-road—Im. in the manufacture of coverings for the ends of cigars.
3182. W. Tate, Horsley-hill, near South Shields, Durham—Imp. in armour, and in making and applying the same for protecting wood and iron ships of war and batteries.

INVENTION WITH COMPLETE SPECIFICATION FILED.

3251. M. Henry, 84, Fleet-street—Imp. in fire-arms, and in adapting bayonets or cutting or piercing warings thereto. (A com.) —28th December, 1861.

PATENTS SEALED.

[From Gazette, January 3rd, 1862.]

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|-----------------------|---------------------------------|
| January 3rd. | 1740. J. Keats and G. E. Keats. |
| 1720. H. Schutt. | 1750. J. Farron. |
| 1723. J. Ridsdale. | 1754. T. G. Messenger. |
| 1727. E. R. Handcock. | 1784. W. Clark. |
| 1728. G. Tutill. | 1936. J. Lewis. |
| 1732. T. Cobby. | 2768. G. Horton. |
| 1734. T. Cobby. | |

[From Gazette, January 7th, 1862.]

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| January 7th | 1817. R. Mushet. |
| 1733. T. T. Macneill. | 1853. J. Sidebottom. |
| 1739. W. C. Parkinson. | 1866. M. Klotz. |
| 1751. J. R. Cotter. | 1765. F. N. Thurel. |
| 1755. H. Ashwell. | 2528. T. P. Bennett & J. Collier. |
| 1758. J. Adams. | 2635. H. Frost. |
| 1766. F. Tolhausen. | 2723. R. W. Winfield. |
| 1783. E. G. F. de la Provotais. | 2724. R. W. Winfield.] |
| 1815. R. Walker. | 2878. W. E. Newton. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, January 3rd, 1862.]

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|----------------------|----------------|
| December 30th. | January 1st. |
| 2995. S. S. Bateson. | 17. J. Harris. |
| 5. J. E. Drouot. | |

[From Gazette, January 7th, 1862.]

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|---|------------------------------|
| January 2nd. | January 3rd. |
| 39. J. Howard. | 52. I. Holden and A. Holden. |
| 84. D. E. Hughes. | January 4th. |
| 153. R. Garrett, jun., and J. Kerridge. | 37. F. Clark. |
| | 42. W. Corfield, jun. |
| | 50. J. H. Johnson. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, January 3rd, 1862.]

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|------------------------------------|
| January 1st. |
| 73. E. Hall. |
| [From Gazette, January 7th, 1862.] |
| January 3rd. |
| 25. G. W. Muir. |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4428	1861. Dec. 28.	Reaping Machine	Richard Alty	Pilling.
4429	1862. Jan. 3.	The Paragon Crinoline	John Whiteside	Kirkham, Lancashire.
4430	" " 6.	Paper Knife and Book Marker	Messrs. R. and G. Gray & Co.	Pond's Works, Sheffield.
			Messrs. Parkins and Gatto ...	24 and 25, Oxford-street, W.

Journal of the Society of Arts.

FRIDAY, JANUARY 17, 1862.

COUNCIL.

At a meeting of the Council, specially summoned, held on Monday last, the 13th instant, it was unanimously resolved that the following letter, with reference to the National Memorial to his late Royal Highness the Prince Consort, be addressed to the Lord Mayor:—

“Society of Arts, Manufactures, and Commerce,
Adelphi, London, Jan. 13, 1862.

“My Lord Mayor,—Although the meeting to be holden to-morrow may be considered perhaps only as a preliminary one towards organising a national testimonial in commemoration of his Royal Highness the Prince Consort, the Society of Arts cannot allow it to take place without affording some token of its sincere regard for its late President; of its sense of his services to Arts, Science, and Manufactures; and of its wish to do all in its power to assist in establishing a memorial worthy of that great Prince.

“I am directed, therefore, to inform your lordship that the Council, subject to the confirmation of the Society, have voted the sum of one thousand guineas to be applied towards the erection of a national monument, the design of which, as well as the mode of execution, shall have been approved of by the Queen.

“The Council also direct me to acquaint your lordship that, in taking this step, which they regard only as one of others which may be adopted to perpetuate the Prince's memory, it is in their contemplation to aid in founding an industrial university and in establishing travelling scholarships in honour of the Prince, both which objects his Royal Highness their President had deeply at heart.—I have the honour to be your lordship's most obedient servant,

“P. LE NEVE FOSTER, Secretary.

“The Right Hon. the Lord Mayor, Mansion-house.”

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £443,700, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The building begins now to assume such an appearance of completeness, that no doubt need be entertained of its being ready for Her Majesty's Commissioners by the 12th of next month—ready, that is to say, in all its most important points. Some delay will possibly occur about the parts in the immediate neighbourhood of the domes, as the immense scaffolding cannot take less than a fortnight to remove; but as the reception of goods will not commence until after the 1st of March, practically a very decided completion is not of great consequence. From the exterior, it would be difficult to say that any work at all was being proceeded with inside, except where the men are heard and seen busy about the domes, and the east and west entrances.

All the ribs of the eastern dome are now completely erected and fitted to the ring at the top, and a considerable portion of the cross-bracing and ties is being fixed. Very shortly, it may be expected that the glazing will commence. In the western dome the ribs are all raised, but they are not yet fixed. The roof has been thrown over the whole of the northern courts, and the greater part of it is glazed and protected from the weather; preparations are being made to floor them. The staircases which lead to the southern galleries are finished, and thus access is obtained to the picture galleries, without the trouble of mounting a ladder. The refreshment courts are advancing very rapidly; the principals of the roof are all fixed, and plastering has commenced.

It has already been stated in the *Journal*, that the south-western court, and the galleries around it, will be occupied by the French.

On the opposite side of the nave Her Majesty's Commissioners have determined to adopt a treatment, which, as it will be of a different character to that of the French on the south side, will have the effect of producing a sense of variety. The north-western court is parcelled out in strips to Belgium, Holland, Switzerland, Russia, Denmark, Norway, and Sweden. From the galleries above there will then be an opportunity of comparing the various methods in which those countries exhibit their products. The Zollverein and States of North Germany occupy the south-western transept, and the corresponding piece on the north is allotted to Austria.

The following arrangements for admission have been made by Her Majesty's Commissioners. Season tickets will be issued at three guineas each, and the holders will have the exclusive privilege of being present at the opening ceremony, on the 1st of May.

The following notices appear in the Monthly Summary of the Proceedings of the Royal Horticultural Society:—

"Arrangements have also been made with Her Majesty's Commissioners for the International Exhibition of 1862, for the issue of joint tickets (price five guineas), conferring a personal free admission both to the Exhibition and the Royal Horticultural Garden. This ticket is to be obtained from the Commissioners, who will account to the Society for a share of the proceeds.

"After the 24th of May, when it is understood that the high charges of the International Exhibition are to be reduced to the uniform rate of 1s. for the rest of the season, the charge for admission to the Garden, except on Fridays and Saturdays, has been practically reduced to 6d.; it still stands nominally at 1s., but to those who also visit the Exhibition it is reduced to 6d."

It will be observed that a holder of a season ticket of admission to the Exhibition, by availing himself of this arrangement, secures, by the payment of an additional two guineas, an admission for every day throughout the year to the Horticultural Garden, a privilege which alone would cost him four guineas. An entrance to the Exhibition, and one that is much desired, will thus be obtained by the new gate of the Horticultural Society, in the Kensington-road, and a visitor, by paying sixpence in addition to the shilling which admits to the Horticultural Garden, obtains an admission to the Exhibition.

CLASS 38A, ART DESIGNS.

The committee in this class is constituted as follows:—The Marquess of Salisbury, K.G., Chairman. The Earl of Dudley, Sir J. P. Boileau, Bart, F.R.S., H. A. Bowler, Esq., Henry Cole, Esq., C.B., C. D. Fortnum, Esq., D. Maclise, Esq., R.A., R. Monckton Milnes, Esq., M.P., Godfrey Sykes, Esq., T. Winkworth, Esq., M. Digby Wyatt, Esq., F.S.A. Superintendent of the Class, John Leighton, Esq.

The following minute has been issued:—

Her Majesty's Commissioners for the Exhibition, being desirous of exhibiting the progress of art designs for manufactures, would be glad to receive contributions from possessors of drawings and models by British artists executed within the century 1762—1862.

Artists, designers, and manufacturers in general are hereby invited to send works, suitably framed and glazed, or if of large size, on strainers, properly prepared for hanging.

Designs in all departments of art industry, capable of reproduction, are admissible in this class. Designs for glass and ceramic wares, precious and other metals, furniture and carving, plastic decorations, and other objects in relief,—also designs for textile fabrics, paper-hangings, mural decorations, tiles, mosaics, inlays, stained, painted, and decorated glass, &c.

Assistance from the possessors of drawings and models by such artists as Chambers, Adams, Soane, Stothard, Flaxman, Pitts, Pugin, Wyon, and others is especially desired, and the Committee trust that the holders of such works will communicate with the Secretary as early as convenient.

Illuminations of an original character will be admitted into this department.

All works must be delivered for the inspection of the Committee on or before the 31st of March, at the South Kensington Museum (office entrance).

*. Intending Exhibitors are requested to communicate descriptions for the catalogue, and approximate size of models and frames without delay.

FIFTH ORDINARY MEETING.

WEDNESDAY, JAN. 15TH, 1862.

The Fifth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 15th inst., W. H. Bodkin, Esq., Vice-President of the Society, in the chair.

The following candidates were proposed for election as members of the Society:—

Atkins, George James	25, Ovington-square, Brompton, S.W.
Barclay, Robert	29, Bucklersbury, E.C.
Beacock, Robert	Beeston-hill, Leeds.
Bingham, Henry C.	Wartnaby Hall, near Melton Mowbray, Leicestershire.
Binnie, Alex. Richardson	7, Upper Lansdowne-terrace, Notting-hill, W.
Brooke, Edward	Norton Lodge, Timperley, Cheshire.
Browne, George	25, Newman-st., Oxford-st., W.
Chappell, James	388, Strand, W.C.
Cranston, James	Birmingham.
Dalley, John Lambert	Woodbury, Addiscombe.
Dawson, Christopher	Weston Hall, near Otley, Yorkshire.
Holdsworth	Reform Club, S.W., and 9, Lonsdale-terrace, Barnes, S.W.
Draper, John	13, Pall-mall, S.W.
Fearon, Frederick	Hill Top, Midhurst.
Fisher, Richard	Bradford, Yorkshire.
Gath, John William	9, Friday-street, E.C.
Heintzmann, Alexis	50, Greek-street, Soho, W.
Huguenin, Gustave	Maple-villa, West Dulwich, land
Jackson, Frederick Rowland	Beech-hill, Armagh, Ireland.
Kirk, John	The Park, Nottingham.
Leavers, J. W.	3, Leadenhall-street, E.C.
Madden, James	3, Bernard-street, Primrose-hill, N.W.
Masey, Thomas Adair	Copthecroft, near Ripon.
Mason, Rev. George	Kingsland Basin, N.E.
Mason, Wm. Henry	22, Kensington-pk.-gdns., W.
Moss, Arthur	Green Mount-terrace, Leeds.
Nichols, William	24, Mecklenburgh-sq., W.C.
Ogilvie, Robert Annesley	Bedford.
Piggot, Joseph A.	314, Oxford-street, W.
Purdie, Thomas	St. Peter's-square, Manchester.
Ransome, Joseph Atkinson	Remington, J. (Messrs. Crawford and Co.)
Remington, J. (Messrs. Crawford and Co.)	72, Old Broad-street, E.C.
Sandell, Richard Barker	Osborne Lodge, Tulse-hill, S.
Schröder, Anthony	26, Clifton-gardens, Maidavale, W.
Squire, Francis	Downend Lodge, Lostwithiel, Cornwall.
Turner, John Pemberton	Snow-hill, Birmingham.
Walker, Henry	47, Gresham-street, E.C.
Weston, John D.	West-park, Bristol.
Wilson, James	Ravensbourne-park, Lewisham, S.E.
Woodward, Horace	Atlas Works, Great Charles-street, Birmingham.

The following candidates were balloted for and duly elected members of the Society:—

Anstie, Alfred	55, Lincoln's-inn-fields, W.C.
Beeton, S. O.	248, Strand, W.C.
Birkin, Richard, jun.	Nottingham.
Clarke, Robert, G.	St. Alban's-road, Highgate, N.
Cutler, Joseph Horatio	New Town-row, Birmingham.
Davey, Joseph	Lewes, Sussex.
Dixon, George	Broad-street, Birmingham.

Dunning, Joseph Wm. ...	{ 1, Field-court, Gray's-inn, W.C.
Finlayson, John Sterling	{ 14a, Weymouth-street, Port-
Hamilton Bruce	land-place, W.
Frauenknecht, Oscar	Bangor House, Shoe-lane, E.C.
Hanrott, Philip Augustus	{ 8, Ladbroke-square, Notting-
	hill, W.
Horton, Isaac	{ New Park-st., Borough, S.E.,
	and 16, Clapham-rise, S.
Hunter, Edward	The Glebe, Blackheath, E.E.
Jackson, Edward E.	49, Rathbone-place, W.
Lamb, George	{ Worting, near Basingstoke,
	Hants.
Lea, John Wheeley.	68, Broad-street, Worcester.
Manning, John	Nottingham.
Payne, Joseph	Highgate, N.
Reid, John	{ 5, Langford-place, Lansdown-
	road, St. John's-wood, N.W.
Scott, Charles A.	24, Ely-place, Holborn, E.C.
Underdown, Emanuel	{ 2, Gray's-inn-square, W.C.
Maguire	
Vaughan, Henry	{ 28, Cumberland-terrace, Re-
	gent's-park, N.W.
Waugh, Edgar Weller ...	3, Goodge-street, W.
Williams, Thomas.....	{ 15, Pembroke-gardens, Bays-
	water, W.
Yeo, Frank Ash.....	{ Belvoir-villas, St. Helen's-
	road, Swansea.

The CHAIRMAN rose and said—I am sure I shall be excused if, before we proceed with the business of the evening, I venture to make some allusion to the great, the irreparable loss which this Society has sustained since its last meeting, by the death of the late Prince Consort, its illustrious President. I think I may venture to say amongst all the numerous and varied institutions formed, for the purposes of utility or benevolence which had the advantage of his Royal Highness's patronage, there was none to which he seemed to devote more of his personal attention and interest than the Society for the Encouragement of Arts, Manufactures, and Commerce. Here it was, as you remember, the great idea, the grand conception of the International Exhibition of 1851 was first, under his Royal Highness's care, promulgated; and had it pleased the Great Disposer of events to have prolonged his most useful and valuable life, we have reason to know that the great International Exhibition of 1862 would have been found to have engrossed the same care and attention, and to be equally the object of his solicitude. Although his Royal Highness was, on all occasions, foremost in the promotion of everything that tended to refine and elevate the public taste, he was not regardless, at the same time, of the success of the manufacturing interests, nor unmindful, but, on the contrary, the promoter, of every practical measure for the improvement of the condition and habits of the labouring classes of the population. Under these circumstances it is not surprising that there has passed over the nation, on the death of this illustrious Prince, a sorrow of the most deep and engrossing kind; and we find the universal feeling to be not only great regret for his loss, but also an anxious desire, so far as we can do so, to sympathise with the beloved

and now bereaved Queen. I will not venture to intrude upon the attention of the meeting by any attempt to describe the feelings of those more active members of the Society who had the privilege of frequent personal intercourse with our late President, and who are, therefore, thoroughly impressed with a sense of his courteous condescension—of his enlightened mind—of his great knowledge of, and aptitude for, business, and readiness on all occasions to promote the objects of this Society. The sense of his great worth of those persons—I mean of the Council and managing members of this Society—has been expressed in an address already presented to the Queen, and our Council has also felt itself at liberty, and called upon to intimate their intention to contribute one thousand guineas from the funds of this Society in aid of any fund which may be raised for a proper memorial of the late Prince which shall receive the Queen's approval; and on both these objects I am sure they will receive the hearty concurrence of every member of this Institution. I cannot conclude without assuring you—and I do so on the part of those who take a more active share in the management of this Society than I am enabled to do—that the loss of our late Royal President will not be found in the slightest degree to induce any relaxation of their efforts to make the approaching Exhibition, so far as their share of the duty is concerned, worthy of his Royal Highness, and they hope to assist in carrying into perfect completeness all the arrangements for rendering it what it was intended to be under his Royal Highness's own auspices, had it pleased God to spare his valuable life. There cannot be a mere striking proof of the interest which this Society takes in this great national work than this fact—that through the instrumentality of this Society a guarantee nearly approaching half a million sterling has been secured, with a view to the successful progress of that Exhibition; when this fact is considered, and when we are aware also, as we have heard from our proceedings to-night, of the constantly increasing number of members of this Society, we have a right to calculate that our efforts have met with general approval, and that the Society still retains that popularity which, in truth, is in a great measure ascribable to the judicious and enlightened patronage of the late Prince Consort, whose loss we, in common with all lovers of their country, now deplore.

The Paper read was—

COMPARISON OF THE YEAR 1851 WITH THE YEAR 1861.

By BLANCHARD JERROLD.

It appeared to me that a few timely comparisons might be made just now between the year 1851 and the year 1861, if only to waylay and confound the prophets of evil who harassed the Great Exhibition of 1851 at its birth.

I remember that a very violent, if not an overwitty pamphleteer—when the Royal Commissioners decided that the building should be of iron and glass—announced a certain number of stones which he was prepared to throw at the

glass palace. Stone the first appeared, and was hurled at the peaceful meeting of the nations; it fell like a feather, and the rest of the promised stones never saw the light. We might say to this foolish stone thrower—we hope he has paid his printer's bill, and there shall be an end of him; but that he had imitators by the dozen.

“Checks and disasters dwell in the veins
Of actions highest reared.”

But because that which is noble has an assured victory, in the end, over that which is ignoble, it is not the less useful to glance at the authors of these checks and disasters, and, if we may, draw a moral out of their discomfiture.

I have been lately looking over Mr. Wentworth Dilke's remarkable collection of the literature (if literature one-twentieth part of it may be called), which the Exhibition of 1851 called forth. Writers of all degrees were tempted by the subject. There were sly sneerers and open enemies, as well as friends and enthusiasts. A writer in *Blackwood's Magazine*, in 1850, was good enough to hope that the Prince Consort's project would be allowed “quietly to drop into the limbo of exploded schemes.”

Angry critics wrote squibs addressed to their “emineences” the Commissioners, on their “stolid imbecility.” Even the illustrious guiding hand of the great undertaking was attacked. On the other hand, excited gentlemen sounded hymns of praise—occasionally, indeed, with rough and clumsy fingers. If a Brummagem Junius saw England's doom glittering, like a reptile, upon the grass in Hyde-park, another and a kinder muse saw in it a world of wonder—

“Too vast for rapture! too sublime for praise!”

Nor was fun wanting. The comic muse chirped; the humorous artist laughed and drew. Those comical creatures from Wurtemberg were laughed at by every visitor, from Her Majesty the Queen down to the least of the charity boys, who were marshalled through the Exhibition under the awful eye of Beadledom, like Mr. Sidney Smith's charity-boys, “full of catechism and bread-and-butter.”

But I confess that I prefer plucking the wings of the birds of evil omen, that they may be held up as a warning to the future throwers of stones that fall like feathers, and the like:—to the author of Belshazzar's Feast, in its application to the Great Exhibition, for instance, who saw not that the great gathering, possible only in times of peace, was meant to conciliate the rival nations of the earth. Dr. Croly said, in 1851, in a sermon on the results of the Exhibition:—“If the distant sight of the prosperity of nations is often a source of jealousy, the nearer sight of it is a source of friendship; that association is, in itself, a means of smoothing down the asperities of national prejudices—the gentle current that rounds the pebble, not the torrent that tears away the shore.”

The success which attended the great International Exhibition of 1851 was due to a happy combination of circumstances. Every nation on the face of the earth had confidence in the people who invited them to the peaceful tournament of Hyde-park. M. Buffet, French Minister of the Interior in 1849, invited the members of the departmental Chambers of Commerce to sanction the admission of foreign exhibitors to compete with them in their forthcoming Paris Exhibition, but the replies of the Chambers proved that France was not yet strong or liberal enough to summon a hundred nations to compete with her in her own capital. The replies of the Chambers showed the strength of French protectionists. They rejected the minister's suggestions, even though they had been told that they should select their foreign competitors.

It is possible, however, that the French minister's circular suggested to the Prince Consort the bold idea of free and manly competition among nations, worthy of the nation that realized it. The late Prince's scheme (only the natural development of the courageous struggles made by this Society to establish great exhibitions of

national industry) for an exhibition of the industry of all nations included no restrictions, nor did it propose to give an unwholesome protection to a single native industry. One hundred nations were to find our ports and custom-houses thrown wide open. If France lacked the courage to brave the industrial contest, England had both the courage and the will. A national exhibition of industry had long been a proposition before the country, and manufacturers had regarded it coldly, but when British skill and strength were asked to stand in open competition with the world—to contest their ground with all comers—the national spirit was awakened. The Prince Consort had conceived an idea that was—as our neighbours have it—true to its proper hour—that was sown when the soil was ready to ripen it.

The seed was sown then in June, 1849. It grew rapidly. On the 29th of the same month, the general outlines of the Exhibition were laid down by the Prince; and at a meeting of several Members of the Society of Arts, held at Buckingham Palace on the following day, His Royal Highness set forth his views on “The Formation of a Great Collection of Works of Industry and Art in London in 1851.” At this meeting the classification of the collection was arranged, but it was still matter of doubt whether the Exhibition of 1851 should be exclusively British or be open to the world. The meeting declared that it was an error to fix any limitation to the production of machinery, science, and taste, “which are of no country, but belong, as a whole, to the civilised world,” and that “particular advantage to British industry might be derived from placing it in fair competition with that of other nations.”

This declaration was the starting point of the Great International Exhibition of Industry of 1851.

The manner in which this great idea was carried out must be fresh in the minds of most Englishmen. Not a shilling came from the public purse. The spontaneous generosity of the British people built the Crystal Palace of Industry, and paid for England's hospitality to the world. It is true that the subscriptions came slowly, but there were men of noble spirit about. Still there were cavillers and croakers, but, as the Rev. J. A. Whish said in his prize essay, “at once it became apparent that the note which was struck was in harmony with the state of the world.”

All that was wanted was a friendly elbow to wake sleepy nations to the music. Mr. Scott Russell, in the quality of representative British elbow, made two official tours through Germany, to wake the Germans to the music of Hyde-park. The generous flame of friendly emulation could, happily, be lit in all civilised parts of the world—for the world was at peace. And, now, men who had carped and sneered; narrow-minded manufacturers, who had held that England was not, commercially, strong enough to summon all the workers of the world to rival her in her metropolis—mystical prophets of shadowy evil were silenced, and it became apparent to the British nation that an event, which would give her new and lasting glory, was about to happen.

Our manufacturers soon showed their opinion on the uses of such an exhibition by demanding 417,000 superficial feet of exhibiting space, about twice the extent that could be given to them. In short, the success which attended the Great Exhibition of 1851 is fresh in all men's minds.

Mr. S. H. Blackwell said, in a lecture on the iron-making resources of the United Kingdom, delivered before this Society:—“However successful we may regard the Exhibition of 1851, for the great purpose for which it was originally designed, namely, to illustrate the progress made up to the present time in the various departments of the arts and manufactures of the world, and however wonderful may have been the vast collection of objects of wealth and industry which the science and skill of modern civilisation there brought together, it may certainly be asserted, that the Exhibition itself displayed, in no one of its details, any more re-

markable instance of modern progress than the vast and stately building which arose, with almost magic rapidity from the ground, and which was no less admirable for its beauty and simplicity than for its amazing vastness, and its perfect adaptation to the purposes for which it was designed. The very conception of the idea of the Crystal Palace, and its successful execution, placed prominently before us the great iron-making resources of the kingdom, and the extraordinary degree of perfection to which some of the branches of our iron manufacture have attained. Whilst other manufactures of the kingdom were illustrated by a careful selection of the most perfect results, attained in their own separate departments, the most remarkable illustration of the present condition of the iron manufacture was to be found in the building itself, which spread its lofty roof and walls of light over all it held, and guarded, with such perfect care and fitness, the boundless stores of wealth collected together from so many parts of the world."

That spring of 1851 will live in the memory of all who spent it in or about London. Early in March signs of extraordinary activity, in reference to the Exhibition, began to engross public attention. Lodging-house keepers became possessed with the passionate idea that great moguls would give uncounted gold for first floors in Camden-town, and that garrets would be the abode of grateful princes. The advertising columns of the newspapers were crowded with offers of little houses at Rotherhithe, to be secured for the nominal rent of ten guineas weekly, or in the Blackfriars-road for the hebdomadal bagatelle of £20. It was a wild time of speculation. Bakers expected to sell bread by the cartload; butchers believed that it would be unnecessary to part the leg from the body of the bullock; brewers believed it to be impossible to brew sufficient beer to supply the impending demand:—and, in the goose feathers of an attic bed, the imaginative lodging-house keeper looked to find the fabled eggs of gold. Editors of newspapers were tormented by suggestive correspondents. No idea was too wild in those hours of excitement. One correspondent gravely suggested that the Crystal Palace should be made to pay the national debt, and that Sir Joseph Paxton should be superintendent-general of the welcome transaction. Pamphlets, poems, sermons, songs, and satires, poured, as I have already described, from the press. Mr. Hunt drew up scientific handbooks; Mr. Charles Knight set forth aptly, "The Curiosities of Industry;" Mrs. Merrifield wrote on the "Harmony of Colours, as exemplified in the Exhibition;" Mr. Wornum produced a prize essay on "The Exhibition, as a Lesson of Taste;" Professor Forbes studied its vegetable kingdom; and Professor Gordon explained its machinery.

That which was noteworthy, however, throughout the excitement, before all else, in this first great International Exhibition of Industry, was the co-operation and emulation on equal terms of men of every race and every creed. We are told that in its success "the future historian will remark the first settled sign of the coming fraternity of nations." * * In that arena, for the first time in the annals of mankind, the Negro, the Malay, the Slave, and the American stood together on equal terms." The lessons that lay crowded in the various departments of the industry of the human race have been already laid before the world in a brilliant series of lectures by learned and gifted men, delivered in this room. To these essays the curious may be referred.

It seemed to me, however, that, having closely watched the progress of our great Exhibition of 1851, and having been connected in a literary capacity with the Universal Exhibition of Industry, held in Paris in 1855, I might venture to suggest some results of experience that would not be altogether useless. The ten years which have elapsed since the first International Exhibition was held, have not discovered the giant strides towards the fraternity of nations which was fondly anticipated by a few poetic minds. Yet it would be wrong to say that these ten years

have no social and commercial progresses to show. A disposition to develop the commercial intercourse of nations has been evinced throughout the continent of Europe. Our relations with France in 1851 were not carried on in that liberal spirit which dominated them in 1861. These exhibitions have familiarised us and our neighbours with new manufactures and processes. In Paris, in 1855, the French made the acquaintance of our potteries, and Messrs. Minton and others found themselves besieged by purchasers in the Palace of Industry in the Champs Elysées. Little matters often point to great results. Every visitor to the Paris exhibition must remember the fierce trade certain exhibitors of Irish bog oak ornaments drove in the British galleries, and how the exhibitors of Mr. Mechi's toilette luxuries by its success tempted speculators to open fine shops for English goods of this description on the Boulevard des Capucines and elsewhere.

On the other hand, Paris opened her brilliant store-houses, and we took a nearer view of them than we had ever before taken. The history of the renowned *articles de Paris*, and of the other art manufactures of France, is highly interesting, showing progress hand in hand with freedom.

The wonders of Parisian art workmanship that glittered along the northern line of the Exhibition building, were the most attractive of all the manufactures of taste in the Palace. They were the latest results of centuries spent by the various governments of France in developing the artistic genius of the working classes. Their story runs back to remote days—to the times of Jean Cousin, Bernard de Palissy, and to Pinaigrier. It traverses the dark times, when the corporations oppressed the industries they pretended to protect and promote; and gave to their chiefs the titles of kings and princes. It may be remembered that Francis I. issued an ordinance requiring the heads of corporations to assume less ambitious titles, and that Henry IV. was compelled to re-issue this order, because some corporations, and especially that of the Paris mercers, had refused to depose their king. But the workmen soon found that these corporations, first organised to combat feudal tyranny, became petty absolute governments. Protection in its most obnoxious form thus clogged the way of progress. Manufacturers cared little about improvements, being free from the dangers of competition. Heavily were the apprentices and journeymen taxed and ground down by sordid laws before they reached the dignity of freemen. Every man who had suffered these taxes and submitted to these laws was not willing to give up privileges so dearly bought; so that working men who had suffered by the tyranny of the corporations in early life, lived to support them, having themselves lived to enjoy the ease of free membership. But, as time wore on, it added to the grievances which, at last, sufficed to crush these unwholesome combinations. Before a man could become a freeman of a corporation he must have produced a *chef d'œuvre*. Then no obnoxious journeyman was ever held to have produced one, and this condemnation kept him beyond the pale of the privileged. At last, the freedom of a corporation became an heirloom in certain families. The freemen loaded themselves with rights and privileges, to the great disadvantage of workmen who did not happen to be their relations or friends. The merchants were banded in like manner; constant broils and lawsuits arose between rival corporations, as between the tailors and the second-hand clothesmen; and a grave discussion settled the line of demarcation between a new coat and an old one. A locksmith dared not make the nails necessary to the completion of his locks, because the manufacture of nails belonged to another corporation. Colbert, the good genius of French industry, was the first man who dared to strike, with a strong hand, at some of these antiquated laws and regulations. It was the mission of the woollen-merchant's son to infuse his large spirit of industrial progress into the national heart. He struck down the custom-house barriers that had been raised between province and province; he encouraged the improve

ment of agriculture; he created the French navy; he planned the great canal of the South; he called lace-makers from Venice and Flanders. At his invitation Vanrobais entered France from Holland, to found the great cloth manufactories of Abbeville. He installed the stocking-loom in the Chateau de Madrid, in the Bois de Boulogne. To him the French owe the Gobelins (that glowed in 1855 upon the walls of the Panorama building); and people, pausing before the great St. Gobain glass, in the nave of the Palace of Industry, might choose to remember that Colbert contributed to the establishment of this manufactory also. To him the French owe their Academies of Science, of Inscriptions, of Painting, Architecture, and Sculpture. But the requirements of the treasury stopped him when he approached the corporations. He could destroy various antiquated and unprofitable regulations, but this system was beyond his reach. He was compelled reluctantly to add to the number of privileged bodies, those of "sellers of oysters in the suite of the court," "testers of salt butter," and other equally important communities. These privileges were matters of bargain on the part of the court. Money was screwed from the pockets of the monopolists at every turn, sometimes on pain of an increase in the number of freemen. The stories of the difficulties which these monopolies threw in the way of men like Argand and Lenoir, are among the remarkable episodes of the history of industry. Turgot has the honour of having planned the abolition of the corporations, and the first French revolution counts among its benefits that of having carried Turgot's plan into execution.

From the fall of the corporations the rise of the Parisian art industry may be dated. The royal manufactories had nursed a class of workmen who could bring art to beautify the highest skill, and the history of modern French industry is the history of working men who have risen to high places. Lyons owes its renown to working men—to Garon, Bouchon, Lasalle, and others. To see that this remark applied, in 1855, to the great industry which produces Paris articles (*Articles de Paris*), it was only necessary for the exhibition visitor to learn the stories of such men as Jeanselme, whose stall of wonderfully ornamented furniture was one of the curiosities of the glass palace. He began life in the Faubourg St. Antoine as a poor workman; in 1855, he owned a great establishment in which about 300 men earned wages. He was not, however, a man of extraordinary fortune, for on all sides close copies of his career might be found. He declared that his only advantage, in the beginning, over hundreds of workmen, was that he knew something of drawing—a something derived from a gratuitous drawing-school in his native province.

And here we approach the secret of these wonderful Paris articles. Without entering into the question of the advisability or non-advisability of paying for the art education of working men out of the public exchequer, it may be safely stated that to these purely gratuitous drawing schools—to these institutions, as liberal and comprehensive as the Conservatoire des Arts et Métiers—to the constitution of the Gobelins tapestry establishment—whither pupils chosen from provincial towns were sent at the cost of the State, to learn the best dyeing processes, &c., and to carry back this knowledge to their native place—and to the Museum of Natural History, where the raw produce necessary to industry was classed and tested—the working men, not only of Paris, but of Lyons, Mulhausen, Rouen, and Abbeville, owe that grace, and that intelligence, which have enabled them to command markets, in which foreigners had the advantage of durability of material only. Indeed, it would appear to many people that art has been cultivated in France, not in aid of, but at the expense of all the solid qualities of manufacturing industry. In their haste to print the perfect pattern, our neighbours have occasionally neglected the perfection of the modest office of the loom. In their admiration of a brilliant dye they have occasionally forgotten the use of a solid thread.

We are told that their furniture is splendid, with its ormolu, enamels, and costly inlaying of woods; but, up to this time, few Paris doors swing fairly upon their hinges. In cotton cloth they cannot approach the looms of Lancashire.

Light as air—daring to rashness—glowing till the eyes aches and is worn out, is the style of art which Paris has reached in her workshops. Here the draughtsman knows no bounds. All that floats to the surface of his brain goes direct, without the balance of a second thought, to the tip of his pencil. He wants a handle to the jug upon which he is engaged:—two crocodiles, one with its hind-quarters in the ample jaws of the other, are not too formidable for his purpose. A tailor gives him an order:—The obelisk of Luxor becomes a stripe down a pair of trowsers; hieroglyphics tell upon founcces; coins that would enrich any museum are effectively strung together for a lady's hair; a stack of arms, with Napoleon in a contemplative attitude before it, is an apt design for a tooth-pick stand; a rag-picker, with his basket at his back, and his lantern in his hand, stands, in bronze, with a load of lucifers behind, and a spirit burner in the lantern, at the service of the smoker. The marriage of the Emperor is not a composition too complex for the use of the embroiderer of shirt fronts, as many visitors in the French Gallery of the Universal Exhibition must have remarked. Neither is the French designer inconvenienced by "Puritanic stays," as his designs, realised in sugar and chocolate, and displayed in gorgeous shops along the Boulevards, and in the Rue Vivienne, every New Year's Day, fully testify. He can be graceful for the jeweller, grotesque for the tobaccoist, and broad for the confectioner. One day he will design a rose leaf, with a diamond dew-drop upon it, for a brooch; on the morrow, Dutchmen carousing over a tub grow out of his nimble pencil, for a tobacco-box, and from the tobacco-box he will wander to designs for a milliner. He has always a new idea at the disposal of his customers. If, last month, rosebuds and grapes were worn in Lucy Hocquet's bonnets, for this month he produces cabbage roses, plums, and cherries. Last month, coronets of bright green leaves encircled the fashionable heads of Parisian ladies; for this month he has a new idea—he paints garlands of seared and withered leaves, of leaves touched artistically by the "fiery fingers" of autumn. From cherries, worn to-day, bright and juicy, he may dare to advance to windfalls, or to fruit half consumed by sparrows!

This tendency of French designers to deal in the extravagant has been undoubtedly fostered and developed under the second empire. Under Louis Napoleon, to be costly is to be fashionable. That simplicity which was wont to be the chief charm of our neighbours' fashions, and that art which gave to common objects and cheap materials the value of simple beauty of form, are now neglected. The Exhibition of 1855 was evidence of the general craving for gold and marble; for lace, at once heavy and priceless; for furniture, at once uncomfortable and dazzling. The Bordeaux book-case, carved out of solid wood, was, perhaps, the only piece of simple French furniture in the Exhibition. The rest surprised beholders, because it was worth so many thousand francs. A child's chair, price £20; an arm chair valued at £80. These were the objects of attraction in the nave of the palace, and these alone in the furniture department. We looked in vain for household goods of common material wrought with taste. We sought, without result, china specially designed for the cottage. We admired tables studded with costly enamels; book-cases laden with gold; clocks resting upon ormolu cupids or serving as battle ground for warriors in bronze; goldsmiths' works unsparingly peppered with precious stones. Marvellous monuments of human patience were the heavy founcces of lace, which only an Imperial purse, unchecked by our prosaic, calculating House of Commons, could buy. Very splendid was the gigantic bird-cage of delicately elaborated oak, set amid hot-house flowers, and musical with birds worth

their weight in gold. Perfect, perhaps, was the taste herein shown. The workman's hand must have had wondrous skill before it could realise that microscopic carving, this faultless polish. But few are the people who can pluck turquoise forget-me-nots, or dally with enamel rose-leaves sparkling with diamond dew. These rare products were acceptable, indeed, as so many *tours-de-force*; but more important is the art which elevates the humble home by simple forms of beauty.

The artist-workman of Paris, however, is a man who delights in costly materials. It is not his mission to diffuse a sense of beauty over his country. If he can conceive any errand beyond that which enables him to frequent his *Barrière* ball, it is to show how ornament may be added to ornament, how silver may be wedded to gold, and ebony to satin-wood. In the Fable for Critics we are assured that—

"Over-ornament ruins both poem and prose,—
Just conceive of a muse with a ring in her nose!"

Now the French art-workman's goddess has a ring on her nose. Not a plain gold ring, if you please; but a golden circle, thickly crusted with gems. His goddess wears nothing that is plain. Her bonnets are orchards; her dresses employ dozens of hands to each; her fingers display the revenue of a state; and upon her bosom lies the wealth that would feed armies. To this showy goddess the Paris workman unceasingly directs his eyes; looking out from a *mansarde*, where a pot of flowers, bought near the Madeleine, after market-hours, is the only beauty. For it is remarkable that Paris, the city where art is the passion of the masses, is conspicuous for the ugliness of its common household goods. Angular straw chairs, deal tables, thick clumsy crockery, and frightfully barbarous stoneware, make up the poor man's *ménage*. Among the middle-classes a gaudy *salon* is seen, with a splendid clock, chairs elaborately ornamented, handsome lace curtains, but here household grace ends. A tea-service is permanently placed upon the *salon* table for the inspection of visitors—a *Sèvres* service possibly—but proceed to the dining-room, examine the crockery in daily use, and you must be thoroughly disenchanted, for these will be found coarse and ugly. It is not that the head of such a *ménage* has no love of art manufacture; on the contrary, he adores it, but it is beyond his means. All he can afford is a *salon* furnished, as he expresses it, with *luxe*, and as there is no medium between *luxe* and positive plainness and ugliness, he is compelled to adopt the style, or want of style, perceptible in his dining-room.

Well, a close examination of the Universal Exhibition of 1855, enabled people of all nations to see these defects and excellencies of Paris art workmanship.

I have no doubt the gentleman who threw that harmless stone at the glass palace, in Hyde-park, if he is alive, is quite prepared to throw another at the Kensington building that is being prepared for the Exhibition of 1862, and that he will ask what good has come of the Universal Exhibitions that have gone before. I should like to point the moral of the stone he threw in 1851, by showing him the rare and cheap produce of our potteries, and of Lancashire becoming household presences in France. I should like to drink, to his better and more liberal temper, in a glass of the cheap claret our new friendship has produced, and recommend him, when he sees generous men helping forward the good works of his day, in the words of poor Elizabeth Barrett Browning, to—

"Keep up the fire,
But leave the generous flames to shape themselves."

When, in the beginning of last year, it became apparent that there was a fixed determination to have another Universal Exhibition of Industry in this country, and that it would be held no later than 1862, the promoters of this new industrial tournament were told that everybody had had enough of Industrial Exhibitions, and that nobody would exhibit. Important Parisian manufacturers told me, last spring, that they should not send a single article;

yet I find their names in the list, and asking for more space than Prince Napoleon's Committee can afford them. A very prominent Sheffield exhibitor of 1851, most positively declared to me, in 1861, that he should not give himself the least trouble for the Exhibition of this year; yet I have reason to know that he is looking rather sharply to his Exhibition laurels at this moment. The Royal Commissioners have received demands for space from ten thousand British exhibitors alone—two thousand more than applied in 1851. We gather, day by day, from the papers, instances of the impetuosity with which our neighbours are throwing themselves into the healthy competition. A considerable number of people, after all, appear to have made up their mind, in 1861, that the great show of 1851 might be repeated without doing them any serious injury.

I mark one most gratifying advance made within the ten years. The *Athenæum*, in 1851, printed the following sentence:—"The absence of Naples seems to make her a self-doomed outcast among the communities of the world." The *Athenæum* will be able to give a better account of Naples a few months hence I have no doubt.

We shall see, when in May next we are admitted to the Universal Exhibition of 1862, the full extent of the good which previous Universal Exhibitions have achieved. M. Jobard has published four bulky treatises at Brussels on the new inventions shown at Universal Exhibitions. This gentleman gives a vast array of facts for the benefit of his countrymen, but the mere existence of his books is enough to prove that the industrial contests of 1851 and 1855, set men thinking of what was good and adaptable to native uses beyond the limits of their own country. There is also reason to believe that travelling has had its natural effect, and that we shall meet our foreign visitors with more toleration for their eccentricities, and better preparations for their comfort than were shown in 1851. For instance, in the important matter of refreshments, we have profited by the experience of 1855 in Paris, and by the ridicule to which we were subjected in 1851.

I remember that in the latter year, M. Jules Lecomte was pleased to recount his London experiences in a little book, which he called, "A Voyage of Disagreeables in London." In this work he alluded to the refreshment stalls of the Exhibition of 1851, and to the prowess of our ladies thereat. He admires their beauty, but, he adds, neither Byron nor Shakspeare have mentioned their appetite. His own experience was startling. He says that "a young Miss declared that she wanted something sustaining. We were near one of those gigantic buffets, the proprietors of which were making enormous fortunes by sustaining the blonde Misses of Albion. I offered to accompany the failing islander. We arrived before the counter. 'What can the bird find here to put into its little beak?' I exclaimed to myself, as I looked upon the massive cakes, the plum puddings, and all the 'plombs' cut into slices, and piled up in the shape of pyramids, appearing at once so nourishing and so indigestible that even a look at them made one feel stuffed. Well, the little bird ate six shillings worth."

This time our Commissioners are determined that M. Lecomte's choice of refreshments shall not be restricted to Midsummer plum puddings and massive cakes. We have seen more of one another; and we shall be in all respects better prepared for the duties of hospitality.

Mr. Eborall, of the South-Eastern Railway, has given me the following as the increase of traffic between England and France by the channel boats, or rather of the issue of through tickets to and fro:—

In 1851,—44,265 first-class passengers, and 27,393 second-class passengers; total, 71,658, travelled between London and Paris. This, of course, was a large increase on the traffic of the previous year. 1861 was not, in any way, a year the events of which promoted an increase of travelling, yet see how the intercourse between the two countries had increased.

Last year, 88,427 first-class passengers; 35,546 second-

class passengers; total, 123,973 passengers travelled between the two capitals. This is an increase of 52,315, even on the Great Exhibition year. It is remarkable that of this increase more than 44,000 were first-class passengers, while only 8,000 were second-class passengers. Within the ten years the first-class traffic between this country and France has more than doubled. This is surely a fact that augurs well for the success of our second universal Exhibition of Industry. I have heard from Aîles Dufour, of Lyons, that the working men's excursions thereabouts are not yet working briskly, but at any rate we shall receive this time considerable bodies of foreign workmen, who will travel hither at a price that was unheard of in 1851. Last year I had the pleasure, with Sir Joseph Paxton and Mr. Layard, of accompanying the first excursion of British workmen that ever visited Paris. These excursionists travelled to Paris and back, by Folkestone and Boulogne, for £1. They spent a happy week in Paris, without crowding or inconvenience, and I am informed that the experiment is to be tried again more than once next summer.

I have now submitted to you a few of the points on which we may make comparisons between 1851 and 1861, gathering from them strong reasons to hold that England did well, for the progress of the world, when she held the first Exhibition of the Industry of all Nations. From the list of the familiar names in the government and preparation of our first great industrial tournament, we shall miss the illustrious name of the wise Prince who was the soul of it; I may add, in conclusion, that the English people also miss with regret, from the generous enterprise, a name that shone brilliantly in 1851—that of Sir Joseph Paxton.

DISCUSSION.

Mr. P. L. SIMMONDS said that the subject opened up by the title of Mr. Jerrold's paper was of a most comprehensive character, and embraced many very important incidents and topics. To quote the words of Mr. Jerrold, "It would be wrong to say that these ten years have no social and commercial progresses to show." Mr. Jerrold had presented to them merely the amusing aspect of the picture, but there were other views of the ten years' progress interesting to the members of a Society devoted to the interests of Arts, Manufactures, and Commerce, which it might be worth while to examine briefly. And the inquiry ought scarcely to be limited to the United Kingdom and France, but should be extended to Europe generally, to America, Asia, and the world at large; especially, too, did the progress of our Colonies stand out prominently in those ten years. We had recently been taking a census of our home population, and many of our possessions had also been enumerating their people, and making even a more careful analysis of their natural and social condition than ourselves. The present therefore offered a fitting opportunity for forming some kind of rough estimate of the present and the past. Firstly, what had been the progress of art in the past decade. There had been one special representation of Fine Art Treasures at Manchester, which had been a great success; but the collection, illustrating modern art, which would be exhibited from all quarters of the world this year, as compared with the works of the past, would be the best answer to the inquiry. It would be found that painting, sculpture, photography, and art education had greatly advanced. If we passed next to manufactures—in which we as a nation chiefly excelled—how striking and prominent were the advances which we had made, although in a few branches the Continental nations were competing creditably with us. Take, for instance, our mining industry—the production of coal had risen to nearly 70 million tons, and the exports of coal had trebled. The value of the machinery and mill-work exported had risen from 1 to 4 millions. The production of iron had risen from 2½ to 3½ million tons, and the value of our exports of iron and iron manufactures in various shapes, had increased from

8½ millions sterling to 21½ millions. The advance in our textile manufactures in the period under review has been enormous. Independent of the immense home consumption by our well-clothed population, the value of the exports of textiles has risen from 44½ to 77 millions. Cotton manufactures alone have advanced from 30 to 52 millions; and Great Britain now supplies cotton goods to the population of the globe to the extent of about 1s. 3d. per head. Woollen manufactures exported have risen from an aggregate of 1½ million to 4 millions sterling, and would have increased to even a greater extent but for a want of larger supplies of the raw material, especially of long-stapled lustrous wools suited to the worsted manufacture. Our African and Australian colonies had hitherto confined themselves to the production of fine merino wools, but the high price realised for long-wools would, ere long, stimulate the more extensive production of that quality in localities suited to it. Looking only at our foreign trade, we should find that between 1851 and 1861 our external commerce, and of consequence, the shipping employed in the carrying trade, had nearly doubled. And for much of this we were largely indebted, as he had shown on a former occasion, to the increase in our steam marine. We were now possessed of 700 or 800 more steamers than we owned in 1851, and these registered double the amount of tonnage. We had also built and registered in the ten years 16,300 merchant vessels, measuring three and a half million tons. Were not these important facts, indicative of progress to a maritime nation, whose ports were always open, and whose commerce extended to every country. He would not speak of the condition and progress of the Royal Navy, although this was a matter of interest, especially at the present time. The advance and improvements in the character of the ships built in the last ten years, and their fittings and armament were patent to all. The improvements in the social condition of the country was also very remarkable. The people were better fed, better housed, better clothed, better educated, possessed more comforts, and generally received better wages. There had been a very large reduction of taxation. The glass and window duty, soap, newspaper stamp, paper, timber, tea, sugar, fruit, and various other minor customs and excise duties, had either been wholly repealed or much reduced. And though the annual revenue raised had been increased by about twenty millions, yet there were causes for this, owing to the position of foreign affairs, which were not likely to be permanent, and a diminution of the national expenditure, especially hereafter, on our naval defences, would, doubtless, lead to a further reduction of taxation. There was a feature in our social improvements which ought not to be passed over without notice, and that was the great increase of postal facilities, which had so largely swelled the correspondence of the country, increasing the letters delivered from 327 to 564 millions. The number of post-offices had been largely increased, and in the metropolis here was not a house a furlong from a letter-box. The money orders had been extended to the colonies, and the number and amount transmitted had nearly doubled in the ten years. The book-post and the Post-office Savings Banks were other conveniences, whilst the foreign postal rate had been largely reduced, and the means of communication been rendered more regular, speedy, and convenient, greatly to the interests of commerce. If we turned to agriculture, great and manifold improvements had been made in the cultivation of the soil and in the harvesting of crops, by cheaper and improved artificial manures and agricultural implements, whilst the latest improvement was the harnessing of steam to the plough. Chemistry, again, had achieved wonders in the discovery and useful application of new dyes, the products of coal, the manufacture of aluminium, &c. If they looked even around them in the great metropolis, they would see much indicative of startling progress made in the past ten years, although occurring progressively under their very eyes. These improvements were likely to

be overlooked. Need he allude to the new bridges, streets, railway termini, hotels, and hospitals, the Crystal Palace, South Kensington Museum, Museum of Economic Geology, and other similar buildings and institutions. Looking abroad it would be found that the position of foreign countries had been materially altered for the better—their political and social condition and commerce had greatly improved. We had concluded many new and important commercial treaties. He had shown the members, in a recent paper, how largely all foreign countries intended to compete in the forthcoming Exhibition, whether from the far East, South America, and even from Central Africa; but one of the latest announced exhibitors was the King of Madagascar, while he had even heard that the King and Queen of the Sandwich Islands contemplated coming over to visit the Exhibition. He had written so much lately on the progress of the British Colonies, that it was not necessary that he should do more than state that their position in 1851 and 1861 was widely different. Then not more than ten or twelve colonies took part in the display, and some of those in a very imperfect manner; now there would be scarcely three or four out of the 50 British Possessions unrepresented, and these had gone in energetically, by the votes of large sums and by creditable personal exertions, to do their best to stand well in the eyes of the visitors. Especially would our great Australian possessions, which have added half a million of people to their population in the ten years, stand out prominently in the Colonial Courts of the Exhibition. Their material progress had been remarkable, and not a little aided by the enormous amount of gold there discovered and thrown upon the world. The colony of Victoria intended to send a gilded pyramid rising forty feet, on a base ten feet square, as a representation of the 800 tons of gold that had been found there in the last ten years. But the gold discovered in the other Australian colonies would probably make up an amount of 200 tons more, whilst we should have supplementary exhibits from the rich gold fields of British Columbia, Nova Scotia, and elsewhere. These gold discoveries might almost all be comprised within the last ten years under notice, and had enabled us to add to our gold coinage 56 millions sterling, besides the large amount put into circulation in Europe and America, and the Colonies themselves. 240 millions might safely be assumed as the aggregate value of the gold discovered in that period. Mr. Jerrold had favoured them with the figures of the increase of traffic between England and the Continent by the Channel boats from Dover and Folkestone, but these were not the only outlets we possessed, and gave but a small indication of the increase of passenger traffic which flowed largely in and out of London, Southampton, and Liverpool, Hull and Leith, Cork and Galway. The increased entries and clearances of sailing vessels and steamers was fully 75 per cent. in excess of those of 1851; and looking at the great facilities which were being offered by the directors of steam companies and railways, and the large increase in these, the number of visitors would necessarily be very great to the metropolis this year. He had no desire to take up unnecessarily the time of the meeting to the prejudice of speakers who might follow, but he could not permit the paper to pass without adding to it some few of the salient facts which necessarily obtruded themselves from the very title.

Dr. COLLYER begged to indorse most fully the sentiments which were so ably set forth in the paper read this evening. It was, he said, patent to the world that the late illustrious President of the Society was the means of inaugurating a new era in the world's history. The last few years had been memorable for benefits which they had conferred, not only on England, but on all parts of the world. He could say, having been in 1851 in a distant portion of the earth, that the effect of that Exhibition of 1851 had been felt as distinctly there as it was in Hyde Park. They little estimated the vast effects of that social intercourse—that bringing together of the peace produc-

tions of the world, which was involved in the grand idea of the Exhibition of 1851. The nations of the earth held England in high respect as much on that account as for her prowess in arms. The greatness of a nation was established more in her manufactures than in her military achievements.

Mr. N. WILSON confessed to some feeling of disappointment. He had listened with considerable interest to the paper, but it appeared to him to be, in many respects, defective as a comparison between the years 1851 and 1861,—or, as he supposed he might more properly take it—a comparison between the Exhibition of 1851 and the contemplated Exhibition of 1862. It seemed to him that if Mr. Jerrold had expended a little less time in humorous description of some of the incidents of the last Exhibition, and also of the social habits of the French artisan in 1855, he might have devoted more time to the illustration of the changes that had taken place in the various industries of this country between 1851 and 1861, and in estimating the position which we should, probably, occupy in 1862, as compared with that which we occupied in 1851. He (Mr. Wilson) had expected that the progress of our arts during the last ten years would have formed the subject of the paper. He had anticipated some illustration of how we had acquitted ourselves in 1851 and might acquit ourselves in 1862, where we had succeeded and where we had failed, and what were our anticipations of success in 1862. Certainly he had expected to hear something with regard to those industries which had either ceased or been very much reduced between 1851 and 1861, as well as of any new industries which had sprung up in the interval. There were branches of industry, which had sprung into existence in that interval. There was one industry—a large and important industry with which he (Mr. Wilson) was more particularly connected, entirely new since 1851, of which no notice had been taken in the paper—that was the sewing machine. In 1851 it was scarcely known. An attempt at a machine of that kind was exhibited in 1851, but it was simply an attempt; but, if he mistook not, in 1862 those machines would form one of the most interesting features of the Exhibition, whether as regarded the beauty of the mechanism or the results effected through its instrumentality. Amongst other industries that had arisen since 1851, he certainly thought the sewing machine was worthy of a passing notice in a paper of this kind. If time permitted, he should have been happy to have brought before the meeting some of the remarkable influences which that industry had created in the labour-market generally, and the effects it had produced in fashion, dress, and manufacture; in fact, in everything to which the human hand, in connexion with the needle, had been applied. Its effects might truly be said to have been marvellous.

Mr. J. H. MURCHISON said he had listened with some attention to the paper and to the discussion that had taken place, and he failed to see the practical results that were to flow from them. One gentleman had referred in a comprehensive manner to the great increase which had taken place in the manufactures and commerce of the country in the last ten years; but he thought both that gentleman and the author of the paper had forgotten to notice the very different position which the great promoter of arts and manufactures—the Society of Arts—occupied in that time. If Shipley (a teacher of drawing), who founded this Society could have foreseen that the day would come when the Society would be presided over by the Consort of our Sovereign—by the Consort of the most popular sovereign that ever ruled over this country, he would have felt sufficiently rewarded for the great trouble and exertions which he underwent to establish this Society. It would be found that, during the early years of the Society, it occupied a most prominent position; its progress increased in a most surprising manner, so that in the tenth year of its existence the number of its members was 2,400, and during the first

twelve years of its operations it distributed no less a sum than £16,000 in premiums for inventions and improvements in Arts, Manufactures, and Commerce, and in thirty years the sum amounted to nearly £30,000, or nearly equal to £1,000 annually; but, almost as it were following the natural course of mortal life, this Society, when it approached towards the end of its first century, became decrepit and effete. About the time when their late illustrious president undertook that office—which, so far as he was concerned, was not a mere honorary position—the number of members was only about that which they had elected in one night during the present session, viz., 300. The number of members at the present time was fast approaching 3,000. They also knew that the Exhibition of 1851 was the offspring of this Society, and if they wanted to ascertain the progress which this Society had made in the last ten years, they would find it in the second offspring of the Society—the Exhibition of 1862. He was sure if the gentleman who had read this paper had given a description of the progress which had taken place in the proceedings and in the results of the proceedings of this Society he could not have given a better history of the practical improvements which had taken place in the arts and manufactures of the country during the last ten years. The Exhibition of 1862 would miss some great names. He did not miss its head, who a few short months ago occupied the chair in that room, and who assured them with his own lips of the great interest which he took in the Exhibition of 1862. His Royal Highness was extremely anxious that it should not be left to others to say it for him, and those who were present would not forget the forcible manner in which His Royal Highness assured the Society, and the whole world through the Society, of the great and earnest interest which he took in its progress, and in the success of the approaching Exhibition.

Mr. JAMES STRIDE said he had expected that the paper would have been of a different character, and would have entered more fully into the important topics embraced by the title. He did not feel that full justice had been done to so large and comprehensive a subject, covering so vast a field as the Exhibition of 1851 and 1862, and the progress of the country in its Arts, Manufactures, and Commerce during that interval.

The CHAIRMAN said the time had arrived for him to submit to the meeting the vote which was usually proposed on such occasions, of thanks to the gentleman who had kindly favoured them by reading the paper they had heard, and he did not shrink from that duty, notwithstanding the observations in which some of the speakers had chosen to indulge. They were in the habit of hearing, in the discussions in that room, remarks tending to elucidate the matter treated of, or to give additional information on the subject of the paper, always expecting that the gentlemen who devoted their time and talents gratuitously to the Society should be treated with something like forbearance in the observations which followed the reading of the paper. He could only say, with respect to some of the observations which had been made, they could hardly expect that in the compass of a single lecture, could be brought before this, or any other meeting, the whole of the vast subject which had been to some extent elucidated by Mr. Blanchard Jerrold; and he must say it would be somewhat too much to expect—if they looked at his name—that there should not be some approach to humour in his treatment of the subject. It now remained for him to propose, and he was sure the meeting would cheerfully adopt it—a vote of thanks to Mr. Blanchard Jerrold, for the trouble he had taken in preparing and reading this paper.

The vote of thanks having been passed,

Mr. BLANCHARD JERROLD said he felt that some of the observations which had been made were not unwarranted by the paper he had read. When it was first suggested to him that he should read this paper—which he had prepared to be read elsewhere—he felt that it was not sufficiently practical to be read before this Society, but his scruples

were overruled, and he had ventured to bring the subject before them. He begged to thank the meeting for the vote which had just been passed, and for the indulgence with which they had listened to him; and he begged, moreover to apologise to the gentleman at the further end of the room (Mr. Wilson) for not having made a special and elaborate reference to the sewing machine.

The Secretary announced that on Wednesday evening next, the 22nd inst., a Paper by Mr. M. Digby Wyatt, "On the Present Aspect of the Fine and Decorative Arts in Italy, with special reference to the recent Exhibition in Florence," would be read.

MEMORIAL TO HIS LATE ROYAL HIGHNESS THE PRINCE CONSORT.

MEETING AT THE MANSION-HOUSE.

On Tuesday, 14th inst., a public meeting, convened by the Right Hon. the Lord Mayor, was held in the Egyptian-hall, at the Mansion-house, for the purpose of adopting measures for the erection of a testimonial to his late Royal Highness the Prince Consort.

The hall was crowded, and among those present were:—The LORD MAYOR, who presided; Lord Stratford de Redcliffe, the Earl of Coventry, Lord Henry Lennox, M.P.; the Bishop of London, the Marquis of Bredalbane, Baron Lionel de Rothschild, M.P.; Mr. Western Wood, M.P.; Lord Elcho, M.P.; Mr. W. Seymour Fitzgerald, M.P.; the Hon. G. Denman, M.P.; Sir Edward Antrobus, Bart.; the Hon. A. Kinnard; Mr. A. Angus Croll; Mr. Harvey Lewis, M.P.; Mr. W. Murray, M.P.; Mr. Tite, M.P.; Mr. Gregson, M.P.; the Hon. J. Stuart Wortley; Mr. R. W. Crawford, M.P.; the Very Rev. Dr. Milman, Dean of St. Paul's; Alderman Salomons, M.P.; Alderman Wilson, Alderman Sir John Musgrove, Bart.; Sir Moses Montefiore, Alderman Sir F. G. Moon, Bart.; Alderman Mechi, Alderman Abbis, Alderman Rose, Alderman J. C. Lawrence, Alderman Gabriel, Alderman Phillips, the Sheriffs Cockerell and Twentyman, the Common Serjeant, Mr. W. Cotton, Mr. Benjamin Bond Cabbell, Mr. Robert Fowler, Mr. Samuel Gurney, Mr. Geo. Godwin, Mr. D. W. Harvey, Mr. C. Wentworth Dilke, Mr. G. F. Young, Mr. J. Griffith Frith, Mr. Peter Graham, Mr. Thomas Winkworth, Mr. John Alger, Mr. W. Spottiswoode, Mr. Robert Hunt, Mr. Charles Hill, Mr. George Moffatt, M.P., Mr. Samuel Morley, Mr. Henry Roberts, Mr. Thomas Sopwith, Mr. W. Foster White, Professor Donaldson, and Mr. Le Neve Foster.

The proceedings having been opened with prayer by the Rev. Michael Gibbs, the Lord Mayor's chaplain,

The LORD MAYOR said—My Lords and Gentlemen—I have convened this meeting to consider the propriety of erecting a lasting memorial to his late Royal Highness the Prince Consort, and of recording, for the information of future ages, the deep grief of all classes at the irreparable loss which the Queen and the nation have been called upon to suffer. The death of the illustrious Prince, whose enlightened and active mind was continually employed in labouring for the improvement of all our social institutions, and ameliorating the condition of the working classes, is a calamity of which at present we can hardly form an adequate estimate. (Hear, hear.) I summoned this meeting in the consciousness that my request would be responded to as it has been this day. There would have been a greater number of highly distinguished personages here if there had been more time. (Hear, hear.) I have many letters from noblemen and others excusing themselves on the score of distance and engagements and obligations which could not be deferred. We have, however, quite a sufficient number in this hall, and we have all classes here represented in a manner

which will satisfy the public mind that this is a proper movement. (Cheers.) I will not occupy the time of the meeting by reading any letters, but there is one so important that I think I should fail in my duty if I did not make some reference to it. The letter is signed "P. Le Neve Foster," the Secretary of the Society of Arts, and the pith of it is, that the Society will subscribe one thousand guineas towards the erection of any monument to the memory of the late Prince Consort, the design and execution of which may be approved of by her Majesty. (Hear, hear.) I may add that if, in addition, it should be thought fit to extend the memorial beyond erecting a national monument—if it should be found desirable to do anything further in order to carry out those great objects which it is well known his late Royal Highness had at heart—then the Society of Arts will again give its assistance to the work. (Hear.) I will not detain you longer, as there are many eloquent and distinguished persons present to address you, and I will conclude by calling upon the Right Rev. the Lord Bishop of London to move the first resolution. (Loud applause.)

The Bishop of London, who was greeted with loud cheers, said—My Lord Mayor, I have been requested to move the following resolution:—"That this meeting, deeply deploring the irreparable loss the country has sustained by the lamented death of his late Royal Highness the Prince Consort, whose powerful and well-regulated mind and great abilities have for more than twenty years been unceasingly devoted to improving the condition of the humbler classes, and to the development and extension of science and art, and to the judicious education and training of the royal family, is of opinion that a lasting memorial should be erected commemorative of his many virtues, and expressive of the gratitude of the people." (Cheers.) I shall certainly, my Lord Mayor, best consult my own feelings by saying very little in moving this resolution. I think we must all feel that we are called upon to say very few words to-day, and that the fewer those words are the better, for in the presence of a great grief silence is what best becomes us. In that bewilderment with which we look to the nature of our loss—and we are at present quite unable to calculate how great that may be—we can scarcely speak of it in adequate terms; and in the presence of that sacred mourning which we may disturb by obtrusive words not suited for the occasion, we had better leave the matter to the deep feeling of the nation than attempt to give expression to our sentiments, which are even now struggling for utterance, although weeks have passed since our loss came upon us. Yet, of course, it is expected that we should in some way indicate the particular form in which we would commemorate our sense of this great bereavement, and I think I may take it for granted that I am expressing the feeling of all present when I say that we are greatly indebted to the Lord Mayor for having called us here to-day. (Cheers.) Not that it is any movement exclusively his own; he has brought us together rather in his capacity as our civic head, in order to give vent and expression to the feelings which are in all our hearts, and we are rather here by ourselves, by our sentiments, and by our desires, than in obedience to any commands or suggestion we have received from his lordship. Doubtless it may occur to many that there are other ways in which the sense of our great bereavement may be expressed. It might not have been unnatural to wait for the approaching assembling of the representatives of the nation; and nothing could be more becoming than that they should testify by some great public act their sense, as the representatives of the nation, of what it has pleased God to bring upon us; but still, perhaps, it would be more congenial to the sentiments of Englishmen that the first movement in this matter should come from among themselves—that it should not have the formal appearance which a vote of the House of Commons must necessarily bear—that it should not be merely the representatives of the people who proposed that a monument should be

erected to our illustrious Prince, but that the youngest and poorest in the land, as well as those who are our chiefs in wealth and rank, should have an opportunity of joining spontaneously in this mode of testifying what they feel in the calamity they have sustained. (Cheers.) Indeed the great characteristic of this national mourning appears to be, that it has been felt with all the force of a domestic sorrow throughout the breadth of this land. (Hear, hear.) Everyone has been touched to see how the poorest as well as the richest have done their best to show their sympathy in this loss; and indeed it would be a great misfortune if the poorest were not encouraged to come forward to give even the smallest portion of their hardly gathered earnings to testify their sorrow, for I am certain that in the heart of the royal mourner with whom we sympathize the kindly feelings of the poor will be as much appreciated as those of the rich and noble. (Cheers.) The youngest child may well be invited to take a part in this national memorial, for certainly as long as their lives last the children now on their mothers' knees will not forget this gloomy time, and will ask as they grow older what was the full meaning of this national sorrow, and will be able to tell to their latest day what it was to see a whole nation bowed down in one feeling of sympathy lamenting the loss of one whom they so much honoured and loved. (Cheers.) Then, as to the particular course our sympathy is called to take, I presume it is intended we shall have a monument which shall speak of but one thing—a monument which shall speak of our deep sorrow caused by the real worth of him whose death we are lamenting. No doubt it has been customary of late to give some sort of secondary utility to the monuments we raise, but I think we do not wish to do that on the present occasion. (Cheers.) It is better, as far as my mind goes, that it should be a monument, and a monument alone. (Hear, hear.) My belief is that if we are to look to utility, nothing will be found more useful than a simple monument, which shall proclaim to the nation how we honour and love the memory of him whom we have so much cause to honour and love. (Hear, hear.) Look at the monuments erected in this metropolis, and throughout the land. I don't think that any one of them, great as are the men whom they commemorate, will be found more really useful than that which we are seeking this day to inaugurate. It is not every man who is able to serve his country in the field of battle, or by achieving great victories; it is not every man who is able to take his part in conflicts in the senate, or to win for himself a distinguished place in some honourable profession in the land; but every man can learn to do his duty well in the station to which God has called him to do it—especially in domestic life, knowing that through the due discharge of domestic duties political life gains its strength, and knowing also that he whom we this day mourn, if he had done nothing else, would have earned the love and admiration of Englishmen for the simple discharge of his duty in domestic life. (Cheers.) We shall point out to our children this monument, and say, "It tells the story of a young man who came to this country from a foreign land, and was unknown here. Englishmen are peculiarly unwilling to learn lessons from foreigners, but he soon won his way to the best affections of the country. We know there is nothing so dear to Englishmen as the due discharge of duty in domestic life. He first won our hearts in that simple manner, and then he was able to go forth into a more public sphere and perform great public duties, the advantage of which we shall reap for many generations, having begun by endearing himself to us in the discharge of all the duties of his home." (Cheers.) I think we cannot over-estimate the force of the lessons which that monument will inculcate in the young men of this generation. They will learn from it what is the reward of those who resist temptations under which thousands of thousands have fallen, and who seek quietly and modestly to dedicate all the powers God has given them to those duties, be they great or be they humble, which He has

called upon them to perform. Certainly we cannot at this moment estimate how great is our loss, nor can we calculate aright how great has been our gain from those twenty years of faithful service, but that that gain has been great we all well know. (Hear, hear.) It is something to live in an age when our nation is united by that feeling of loyal love to the throne which binds us together as one family—(cheers)—and to no one more than him whom we have lost are we indebted for that great characteristic of Englishmen which makes all nations of the earth at this moment understand how glorious a position it is to be the Queen of this free and loyal people. (Loud cheers.)

Alderman S. WILSON, the senior alderman, said he concurred most heartily in all that had fallen from the right rev. bishop, and he had great pleasure in seconding the resolution.

The resolution was then put by the LORD MAYOR, and carried by acclamation.

LORD STRATFORD DE REDCLIFFE then came forward to move the next resolution, and was received with loud applause. He said—It was, my Lord Mayor, with ready submission to the kind request which you addressed to me, that under a deep feeling of the importance of this meeting I came up from the country to be present at it. (Applause.) I could not come with the hope of adding anything to what has been said by far abler persons than myself, nor can I hope to embody in any satisfactory manner the sentiments which the whole nation has expressed on the loss which we have sustained in the death of the late Prince Consort, but I do feel that at a meeting of this kind it is the duty of every person not to neglect the opportunity of expressing their desire to re-echo the national feeling by supporting any testimonial which it may be proposed to adopt. (Applause.) The right rev. prelate who preceded me has justly observed that it would be inappropriate on this occasion to do more than point attention to the universal sentiment elicited throughout the country; but at the same time with an impressive eloquence which every one admired, and with an expression of thought which commanded your sympathies, he said all which the nation has expressed, and all which the nation requires. My Lord, I am happy to find that in the heart of this great city one of the earliest efforts to do justice to the memory of the Prince whose loss we all deplore has taken place. It is becoming in such a matter that the City of London, representing as it does the whole range of the arts and manufactures of the country, should be early to take the field in honour of that Prince who was so endeared to us by the perfect tie of domestic life, and whom we learnt to esteem and revere from the deep desire he ever evinced to advance the welfare of the country, and above all of the great masses of the working classes of this country. But, my Lord, there are matters which give to his character the most endearing recollections. We cannot, in turning our thoughts to this subject, but see the Lady who is not only sovereign in this land, but who has fixed her reign in the hearts of her people a reign of unexampled prosperity, and under whose beneficent sceptre England is enjoying all the dignity, honour, and happiness which so particularly mark the present era. (Hear, hear.) The right rev. prelate has called attention to the fact that the late Prince Consort came to this country a youth and a foreigner; but as a youth he showed in the highest degree sound sense, great virtue, and marked self-denial, while as a foreigner he studied our language and he acquired it; he identified himself with all the best sentiments and convictions of the institutions under which we live. (Cheers.) It is domestic virtues which go most home to the feelings of the people of England; and in her soil we see not only flourishing that plant which has withered in so many other countries, but we see it expanding more and more in this, under an example such as has been set by our most gracious Sovereign and the late Prince Consort. We have seen him as the irresponsible adviser of the crown, not surrounded by favourites—not opposing himself as a barrier between the crown and its constitutional advisers, but on the contrary

eliciting the greatest advantages for the country, and carrying out those constitutional principles to which, whatever may be the variety of opinions, we are from one end of the land to the other cordially attached. My Lord, I feel it is unnecessary that I should go more fully into the subject. No doubt we are not yet in a position to judge of all that we have lost. Such was the delicacy of the position of the late Prince Consort, such was the extent of his usefulness, that we cannot yet estimate to what degree we shall feel that loss which we now consider as irreparable. (Hear, hear.) But I will add, I fully agree that it is most desirable that we should erect such a monument not only in justice to ourselves engaged in an act of honour to our Queen, but in justice to ourselves in showing our sense of the loss which the country and this great representative of the country—the City of London—has sustained. (Hear.) By perpetuating the example we shall be best carrying out the object which the late Prince Consort had at heart, the advancing of the prosperity of the country. (Hear, hear.) I cannot sit down without thanking you all for the kind attention with which you have heard me—(applause)—and beg to submit the following resolution:—"That the memorial recommended should be of a monumental and national character; and that its design and mode of execution be approved by her Most Gracious Majesty the Queen."

MR. WESTERN WOOD, M.P., in seconding the resolution, said—My Lord Mayor, ladies, and gentlemen,—I little anticipated when I came into this magnificent hall that I should take any prominent part in these proceedings; but it is my great privilege to be permitted to offer you a few observations. I do so with the greatest satisfaction to myself, though at the same time with the deepest regret at the cause, for I am desirous to bear my humble testimony to the high character of him we have lost, and of showing respect and attachment to his bereaved and widowed Queen. (Hear, hear.) There may be some difficulty as to the mode in which the monument to the late Prince shall be executed, but there can be no difficulty in this, that whatever we may do to perpetuate in his memory it must fall short of the object. (Hear, hear.) It is needless, after the eloquent speeches of the Bishop of London and of the noble lord who has preceded me, that I should dwell at any length on the virtues of the illustrious Prince who was so suddenly taken from amongst us. We are told that,

"The evil that men do lives after them;
The good is oft interred with their bones."

In this case I do not know of any evil which can live after him whom we now deplore, and satisfied I am the good, the great good, done by his Royal Highness, will ever live most gratefully in the memory of an attached people. I have the honour to second the resolution; it will be for you, ladies and gentlemen, to sanction it; and in that I am sure you will have no difficulty, for the right rev. prelate has placed before you the advantages which will result from the course recommended by the committee. I have the greater pleasure in seconding the resolution for this memorial, because it contains the words, "That its design and mode of execution be approved of by her Most Gracious Majesty the Queen." (Applause.) That is such an important part of the resolution that I have referred to it. I shall not longer trespass on your time; others will more eloquently place before you the more salient points of the subject; and feeling with the right rev. prelate that nothing we can say can enhance the memory of the late Prince, I say

"Come thou expressive silence, muse his praise."

The resolution having been carried unanimously,

BARON ROTHSCHILD, M.P., in moving the next resolution, "That committees throughout the United Kingdom be formed to raise subscriptions to the proposed memorial, and that *all* her Majesty's subjects be invited to subscribe," said, I am sure it is only necessary that this resolution should be made known throughout the kingdom that it

may be properly responded to. We have seen the sorrow and grief which has been exhibited at the irreparable loss which the Queen and the nation has sustained, and we shall see every subject of this realm gratified at the opportunity of expressing his grief at the loss sustained. (Hear.) It generally happens, after the loss of a great statesman, who has conducted the affairs of this country, that his opinions and his wishes are carried out after his death by the members of his own party who have worked with him. On the present occasion this great loss belongs to no party, or rather, I should say, it belongs to all. (Cheers.) The late Prince was revered and respected, on the one hand, for his profound judgment and great learning, and was looked up to, on the other hand, for his liberal and enlightened views. All those who had the honour of knowing him mourn his loss, while the nation at large regret his loss as that of a good and pious Prince. (Cheers.) I can only say I am sure the present resolution will be properly responded to, and that we shall have a memorial—which for the present generation is not necessary, but to which future generations will point as a remembrance of a Prince beloved by the nation.

The Hon. GEORGE DENMAN, M.P.—My Lord Mayor, if I have any regret on the present occasion beyond that which the whole land now feels, it is that, owing to the exigencies of public business, there are not here more distinguished members of the profession to which I have the honour to belong, to second the resolution which you have heard read, because I am sure that this is a proceeding in which the highest judge in the land might be proud to take a part. (Cheers.) I entirely agree in the sentiment which has been more than once expressed, that this is not a time when, by making a long speech, the meeting could be brought to join more cordially in the object in view. Perhaps, however, I may be permitted to make one allusion, and from the name I bear it may not be considered quite out of place. I am old enough to remember even myself, and there are many more present who can remember and appreciate it better than I can, an occasion when in this city, and throughout the land, some of the most loyal people, and those most attached to our institutions, were constrained to speak of royalty in language far different from that in which we speak of it now. (Cheers.) I won't enlarge upon that topic, but all of us know and feel that a part of that sentiment—a part of the satisfaction felt at the present day—must be due to one who even taught the Throne itself better to know its duties than it could have known them if it had remained in solitude and uninstructed during the last twenty-five years. (Hear, hear.) There is only one other point to which I will refer, and I do it in justice to the profession to which I have the honour to belong. I have always considered that one of the highest claims upon that profession was that it should so exercise its functions as to make the people appreciate and love the laws. Now it was that feeling, I believe, which made the late Prince Consort, as soon as he became the partner of her Majesty the Queen, and an Englishman by virtue thereof, at once to set himself to study and master our laws. He took to himself one of the most learned professors of the law as his instructor, and he did not merely talk about the subject, but he worked until he understood our institutions and was enabled to love them; and thus I am sure he became better qualified to give advice in that quarter where it must have had a most important effect upon the whole nation.

Mr. HARVEY LEWIS, M.P.—I have great pleasure in moving the resolution which has been placed in my hands for the purpose of carrying into effect those which have gone before, namely:—"That a committee be formed, consisting of the following noblemen and gentlemen, to carry into effect the foregoing resolutions, with power to add to their number, and that the Right Hon. the Lord Mayor be president of the same, and treasurer to the fund: the Right Hon. and Right Reverend the Bishop of London, the Right Hon. Lord Stratford de Redcliffe, the Earl of Coventry, Lord Elcho, M.P., Lord Henry Lennox, M.P.,

Hon. J. S. Wortley, Hon. G. Denman, Q.C., M.P., Hon. A. Kinnaird, M.P., Sir Edmund Antrobus, Bart., Sir Moses Montefiore, Bart., Sir Morton Peto, Bart., M.P., Sir Thomas Phillips, the Very Rev. Dr. Milman, Dean of St. Paul's, Baron L. D. Rothschild, M.P., Mr. Alderman Copeland, M.P., Mr. Alderman Wilson, Mr. Alderman Sidney, Alderman Sir F. G. Moon, Bart., Mr. Alderman Salomons, M.P., Mr. Alderman Finnis, Mr. Alderman Rose, Mr. Alderman W. Lawrence, Mr. Alderman Hale, Mr. Alderman Phillips, Mr. Alderman Gabriel, Mr. Alderman Mechi, Mr. Alderman Abbiss, Mr. Alderman J. C. Lawrence, Mr. Alderman Dakin, Mr. Alderman Besley, C. J. Cockerell, and W. H. Twentymen, Esqrs., Sheriffs of London and Middlesex; John Alger, Esq., N. Alexander, Esq., W. Angerstein, Esq., M.P., Thomas Baring, Esq., M.P., Joshua Bates, Esq., W. H. Bodkin, Esq., Rev. W. Brock, C. S. Butler, Esq., M.P., Thomas Chambers, Esq., Common Serjeant, Harry Chester, Esq., Henry Cole, Esq., C.B., R.W. Crawford, Esq., M.P., A. A. Croll, Esq., George Cubitt, Esq., M.P., C. W. Dilke, Esq., John Dillon, Esq., J. G. Frith, Esq., P. Le Neve Foster, Esq., R. N. Fowler, Esq., Henry Ghinn, Esq., Rev. Michael Gibbs, M.A., G. Godwin, Esq., F.R.S., P. Graham, Esq., S. Gregson, Esq., M.P., Russell Gurney, Esq., Q.C., Recorder of London, Thompson Hankey, Esq., M.P., Charles Hill, Esq., W. Hawes, Esq., Harvey Lewis, Esq., M.P., S. P. Low, Esq., J. C. Macdonald, Esq., Charles Mills, Esq., G. Moffatt, Esq., M.P., Samuel Morley, Esq., W. Murray, Esq., M.P., J. T. Norris, Esq., M.P., R. N. Philipps, Esq., Henry Roberts, Esq., Abel Smith, Esq., M.P., S. G. Smith, Esq., M.P., Joseph Somes, Esq., M.P., Thos. Sopwith, Esq., F.R.S., W. Spottiswoode, Esq., F.R.S., W. Tite, Esq., M.P., W. Foster White, Esq., T. Winkworth, Esq., Western Wood, Esq., M.P., John Wood, Esq." I am quite sure that the list of the committee, which will be increased by the addition of other names, will meet with general approval, and that we shall have a monument worthy the illustrious departed, which will hand down his many and great virtues to the latest ages. (Cheers.) I am convinced, that when we consider that our most gracious Queen will finally approve of the design which is to be presented by the committee, we shall have a guarantee that our wishes will be carried out in a way gratifying to our feelings, and fully expressive of our deep and unalterable sense of the loss sustained by the death of the illustrious departed. I would beg all present never to lose sight, in considering the design for this monument, the eminently pious and practically useful character of the late Prince Consort. I believe that a true feeling of religion, and a deep sense of that which all of us owe to the Almighty, pervaded every act of his life. When you leave this magnificent hall, and turn to the right, you will see the Royal Exchange, in which so much of the commerce of the whole world is arranged, and you will observe on that great monument of our commercial industry an inscription, which I think I am correct in stating was originally suggested by His late Royal Highness the Prince Consort—"The Earth is the Lord's, and the fulness thereof." If he left no other monument but that expression of his full and sincere dependence on the Almighty Disposer of all events, need I say that it is enough to make us deeply mourn over the irreparable loss which the whole nation, as well as our beloved Queen, has sustained. (Applause.)

Mr. P. LE NEVE FOSTER said—It affords me great gratification, connected as I am with the Society of Arts, that I have the honour of seconding the resolution which Mr. Harvey Lewis has proposed. I can assure you that the Society of Arts must feel—and naturally feel—a great interest in this subject, and a deep regret at the loss of a Prince under whose guidance it has flourished, and by whose judicious advice it was so constantly assisted. (Hear.)

This resolution was also, like the others, carried.

The Earl of COVENTRY moved a vote of thanks to the Lord Mayor in the following terms:—"That the cordial

thanks of this meeting be given to the Right Hon. the Lord Mayor for convening and presiding over the same." We are called upon to offer our thanks to the Lord Mayor for giving us this opportunity of recording our admiration of the Prince Consort while living, and our deep and heartfelt sorrow for his loss now that he is dead.

Mr. S. MORLEY said he had the greatest pleasure in seconding the resolution, and especially because the example which the Prince Consort had set in his domestic life was confined to no class, and there was not a family in Great Britain which had not been benefited by it.

His lordship having briefly returned thanks, the proceedings terminated.

WESTERN AUSTRALIA. — GREGORY'S EXPEDITION.

It is seldom we have, on the departure of the foreign mails, events to report so interesting and important as those which have transpired since our last summary. The safe return of Mr. Gregory and his party from exploring that portion of Australia lying between Shark's and Roebuck Bays, after an expedition which has been not only successful in its results, but also carried out without a single mishap to any of the party, is a matter for congratulation to himself and all concerned in promoting it. The discovery of a very great extent of good country, of easy access, and well watered by large rivers and frequent smaller springs, is too unusual in Australia not to excite great attention in England, particularly as one of the main objects of the expedition was to ascertain whether the country is available for the culture of corn, which we maintain it has proved to be in an eminent degree. Mr. Gregory's journal has not yet been made public, but, from the information given by him, we gather that from Nicol Bay, the starting point, the route was generally to the south-west and south-east, until within sight of the Valley of the Lyow, the country generally being fertile grassy plains, crossed by a range of hills named Hamersley Range; two rivers were met with—the Fortescue, a stream two hundred yards wide, in longitude 118 deg., 4 min. E., lat. 21 deg. 8 min. S., with steep and strong banks, and the Ashburton, in about 23 deg. S., trending towards Exmouth Gulf. On the return to the coast a more easterly direction was taken, when a third river, named the Sherlock, was met with and followed to the coast 20 miles west of Depuch Island, much of the country being of a grassy fertile description, which was also its character from thence southwards to Nicol Bay, where the party arrived on the 19th July. A fresh start was made on the 29th, crossing the Sherlock, and taking an E.S.E. course, met with a river named the Yute, in 21 deg., 4 min. S., which was followed for two days through a grassy, well-watered, but rocky country. An easterly course took them through a hilly country to a river named the Strelley, lat. 21 deg., 27 min. S., long. 119 deg., 23 min. E.; a course still to the E. was continued, and a river named the Shaw was met with in 119 deg., 44 min., E., 21 deg. 15 min. S., flowing north through a good country. The easterly course was continued, passing a river named the De Grey, in 120 deg., 30 min., E., and 21 deg., 18 min., S., and another named the Sakover, running to the north, with very superior country, and still further to the eastward the party was stopped by extensive plains of drift sand, evidently brought by some large river from the interior, and blown from its bed across the plain by strong S.E. winds.

Attempts were made for five days without success to get further eastward, when a return was made by the Oakover and the De Grey, through a fine grassy country, extending from ten to twelve miles from the river's banks. The sea coast was made at Broadsea Inlet, where was found a fertile alluvial district. A south-west course was then taken to Nicol Bay. It will be seen that although Mr. Gregory was unable strictly to explore the whole extent of the country comprised in the route set forth by the

Royal Geographical Society, an important district has been traversed which before long will undoubtedly become occupied for pastoral and also, probably, agricultural purposes. The country appears to be remarkably fertile, and well watered, but wanting in timber, which was only to be met with on the banks of the rivers; the heat appears to be great, but not so as to distress the party. The rivers abounded with fish, and no alligators were seen in them. Many of the flowers met with are described as being of the most gorgeous colours; fruits of the fig and mango kind are said to be plentiful. Animals were scarce, but several new varieties of birds were found. At Nicol Bay, the crew of the *Dolphin* found the large pearl shell of commerce plentiful, and also some very good pearls were obtained, as also four tons of the shells. The rivers discharge themselves into the sea by separating at some distance into several small creeks, and as the tide rises from 16 to 20 feet, it is therefore easily to be understood how it is they were never discovered by the naval surveying ships, which have been at times employed on the coast. The most easterly point reached was long. 121 deg., 40 min.—From the *Perth* (Western Australia) *Gazette*.

Home Correspondence.

STEAM TELEGRAPHIC AND FOG SIGNALS.

SIR,—I beg to state, for the information of Mr. Delabere Barker, that it is now more than ten years since I described and published in the *Mining Journal* of that date, a stentorophonic signal or whistle, blown either by steam, condensed air, or the mouth, that is to say, I placed the whistle in the focus of a parabolic reflector. Of course, the intensity of the sound in the direction of the axis is vastly increased, and can be heard at a far greater distance than the simple whistle. It is reported that Alexander the Great possessed a stentorophonic machine so constructed as to enable the voice of a man to be heard at the distance of twelve miles, or throughout the whole of his immense army. An old French writer on the physical sciences, M. Chaptal, goes so far as to give the figure of it, which is that of a hollow globe of thin copper, fifteen cubits in diameter, with a mouthpiece on one side and a trumpet bell on the other. If such was its form, it must have been on the principle of the whispering gallery of St. Paul's Cathedral, and not on that of the ordinary speaking trumpet.

Most undoubtedly very great benefit is to be derived from the addition of a bell, whether patented or otherwise, to the ordinary steam whistle; but Mr. Delabere Barker is in error if he supposes that the trumpet, of whatever form, will drive the whole sound produced in the direction of the axis, for, on the contrary, the sound is heard notwithstanding, in all directions, but with less intensity.

The paraboloid is the form most recommended by the mathematicians, because all rays from the focus are reflected in a direction parallel to the axis, and also that it be constructed of thin elastic metal. Facts, however, do not correspond with theory, because if any speaking trumpet be lined throughout with green baize, and also be covered with the same material, none of its powers will be lost, but words are more distinctly heard. On this principle a very useful pocket speaking trumpet of some size might be made, quite sufficient to render an ordinary voice very distinct at great distances; but as this convenient form is not, and cannot now be patented, it is useless to hope for its being manufactured for sale.

It is a singular circumstance that the speaking trumpet has remained for centuries in *statu quo*, the manufacture being confined to the supply of the shipping marts, as the Minories, Wapping, &c., in London. The makers appear to have only one idea, that of imitating as closely as possible the musical trumpet, which requires a very narrow neck, while on the contrary stentorophonic tubes require no neck whatever, and should invariably consist of two parts only, namely the mouthpiece and the sounding bell.

In regard to fixed situations where colossal stentorophonic bells may be used, the enormous distances to which powerful sounds may be caused to extend is wholly unknown to our present experience, especially when something like a large reflecting ear trumpet is also used to catch the distant sound.

Many years since the trumpet principle was applied to cannon by an officer of the navy, but besides being wholly inapplicable on a large scale, explosive sounds cannot be compared in audibility to those which are prolonged. The steam whistle has also this great advantage, that it will produce a sort of gamut or scale of notes, according to the power of steam let on, so that numerous distinct signals may be produced by one whistle by means of a set of keys, as in the cornet-à-piston. I take the liberty of enclosing for inspection the original rough draft of my application, of which a copy was furnished to the editor of the *Mining Journal* of the above-mentioned date.

I am, &c.,

HENRY W. REVELEY.

Proceedings of Institutions.

BACUP MECHANICS' INSTITUTION.—On Thursday evening, the 2nd of January, the twenty-third annual festival of the Bacup Mechanics' Institution was held. Lawrence Heyworth, Esq., President of the Institution, occupied the chair. Mr. Newbigging read the twenty-third annual report, which showed that the past year had added in an unusual degree to the popularity of the Bacup Mechanics' Institution. The directors had few reverses to chronicle, while the successes which have attended their efforts in the cause of popular education were numerous and unmistakable. Should the number of members continue in the future to increase in the ratio of the last two years, the enlargement of the Institution would be a question for the serious consideration of the directors. To the library 231 volumes had been added during the last twelve months. Donations and legacies of books and money, with the special object of making it worthy of the town and neighbourhood of Bacup, would be gratefully received. The issues during the year were 5,356, or an average of seventeen volumes for every member whose name was on the register. The improvement of the newsroom had also occupied attention. Many of the best literary and scientific journals had been added, and the Edinburgh and London Reviews were now supplied. There were 40 newspapers and journals taken regularly, and there were also occasional pamphlets, &c., on important subjects. The total number of members was 869. In addition to which there had been 98 male and 39 female scholars, who, by paying a weekly sum of twopence, had the privilege of attending the night school only. The attendance had averaged—males, 56; females, 26; increase, 15. A class for the study of chemistry, mutually conducted, was commenced in July last. The attendance of the female class had exceeded the anticipations of the directors, and to aid in maintaining its popularity prizes would shortly be offered for competency displayed in reading, writing, arithmetic, and domestic economy. At the recent examination of the Lancashire and Cheshire and East Lancashire Union of Institutions twelve of the young men were awarded prizes or certificates. The day school was maintained in its usual efficient state, and was attended by 252 scholars. The subjects taught in both day and night schools were reading, writing, arithmetic, decimal coinage, mensuration, geometry, algebra, grammar and composition, geography, English History, and chemistry. The cost of improving the Institution building had been upwards of £100, which had been entirely liquidated. The directors begged to thank Lawrence Heyworth, Esq., of Liverpool, for a regular supply of newspapers and periodicals; Samuel Hall, Esq., and others for presents of books; J. Ormerod, Esq., of Sharneyford, for a valuable gift of chemical apparatus. The meet-

ing was addressed by the Rev. H. Hall, of Rawdon College, the Rev. Hugh Stowell Brown, of Liverpool, Mr. Robert Rumney, of Manchester, the Rev. Mr. Battene, the Rev. T. Lawson, and other gentlemen, and a cordial vote of thanks was passed to the chairman. Various musical performances were given during the evening.

MEETINGS FOR THE ENSUING WEEK.

- MON.....British Architects, 8. Mr. Henry Roberts, "On the Essentials of a Healthy Dwelling, and the extension of its benefits to the Labouring Population."
Medical, 8½.
- TUES...Civil Engineers, 8. Renewed Discussion upon Mr. Bailey Denton's Paper, "On the Discharge from Under-drainage, &c.;" and, if time permits, Mr. Joseph D'A. Samuda, "On the Form and Materials for Iron-plated Ships, and the points requiring attention in their construction."
Statistical, 8. Mr. F. Hendriks, "On the Statistics of Sweden."
Pathological, 8.
Royal Inst., 3. Mr. John Marshall, F.R.S., "On Physiology of the Senses."
- WED...Society of Arts, 8. Mr. M. Digby Wyatt, "On the Present Aspect of the Fine and Decorative Arts in Italy, with special reference to the recent Exhibition in Florence."
Geological, 8.
R. Soc. Literature, 4½.
Archæological, 8½.
- THURS...Royal, 8½.
Antiquaries, 8½.
Royal Inst., 3. Professor Tyndall, "On Heat."
Philological, 8.
- FRI.....Royal Inst., 8. Professor Rolleston, "On the Affinities and Differences between the Brain of Man and the Brains of certain Animals."
- SAT.....Asiatic, 3.
R. Botanic, 3½.
Royal Inst., 3. Rev. A. J. D'Orsey, "On the English Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, January 10th, 1862.]

Dated 18th November, 1861.

2899. A. J. Mandella and W. Onion, Nottingham—Imp. in machinery or apparatus for the manufacture of looped fabrics.

Dated 20th November, 1861.

2917. F. Puls, 25, Francis-terrace, Hackney-wick—Imp. in treating fatty and oily matters.

Dated 27th November, 1861.

2981. F. F. Dumarchey, Boulevard de Strasbourg, Paris—Imp. in machines for crushing and pounding stones, ore, and other materials.

Dated 3rd December, 1861.

3027. A. M. A. Pichery and P. L. Danais, Nantes—Imp. in hermetically stopping or covering jars, pots, vases, and other like articles.

Dated 7th December, 1861.

3067. T. Lawes, 65, City-road—Imp. in the manufacture of quilts and coverlets.

3076. B. W. Gerland, Newton-le-Willows, Lancashire—Imp. in the manufacture of sulphate of copper and other salts of the same metal.

Dated 13th December, 1861.

3123. S. B. Hewett, Railway-cottage, Fairfield-road, Bow—Imp. in the construction of boilers or generators for steam engines and other uses, applicable also to evaporators, and in pumps used therewith or otherwise used, some of which imps. in pumps are applicable to pistons and piston rods generally.

3129. J. W. Friend, Freemantle, Southampton—Imp. in apparatus for registering the depth and flow of liquids, and the distances run by ships at sea.

3131. T. B. Gibson, Glasgow—A new or improved method of ornamenting certain fabrics.

3132. S. Padley, Swansea—Imp. in paddle wheels.

3133. P. Quantin, Bouscat, near Bordeaux, France—Manufacturing moulded earthen or stoneware cross sleepers for superseding wooden ones in the construction of railways.

3140. R. A. Brooman, 166, Fleet-street—Imp. in and apparatus for the production and application of motive-power in locomotive and other steam-engines. (A com.)

Dated 14th December, 1861.

3142. E. C. B. de Beautieu, Avallon, France—Imp. in apparatus for extracting gold dust from auriferous sands.

3145. C. McDougall and J. Crane, Manchester—Imp. in raising and supporting ladies' dresses.

3150. E. Cajot, St. Servais, Belgium—Imp. in the treatment of pyrites for the manufacture of iron.

Dated 17th December, 1861.

3159. W. H. Tucker, 181, Fleet-street—Imp. in locks.

Dated 18th December, 1861.

3167. S. Sheppard, Birmingham—A new or improved tap or stop cock.
3169. M. Cartwright, Carlisle—Imp. in the manufacture of beds or palates for the reception of artificial teeth.
3173. J. Piddington, 52, Gracechurch-street—Improved condensing apparatus for steam engines. (A com.)
3179. C. Pontifex, St. Paul's-road, Islington—Imp. in refrigerators for cooling worts or other liquors.

Dated 19th December, 1861.

3181. T. Bourne, 16, Charlotte-street, Bedford-square—Imp. in cotton gins. (A com.)

Dated 20th December, 1861.

3186. W. Makin, Attercliffe, Sheffield—Imp. in apparatus for the manufacture of cast steel, mill chisels, and other taper tools and files.
3187. J. Standfield, Aylsford, Kent, and J. Standfield, Stratford, Essex—Imp. in machinery or apparatus for giving motion to ships and machinery and for raising water.
3189. C. E. Wilson, Monkwell-street, Falcon-square—Imp. in collars for gentlemen's, ladies', and children's wear.
3191. J. Westwood, London-yard, Poplar—An imp. in the construction of hydraulic pipes.
3193. G. Warkland, Saint Pierre-les-Calais, France—An improved machine for winding lace or other similar fabrics or tissues on cards or other materials.
3194. W. Tipple, Clarence-place, Gravesend—Imp. in paddle wheels for the propulsion of ships and other navigable vessels.
3195. V. d'Almeida, Nottingham-street, Marylebone—An improved mode of obtaining colouring matter applicable to dyeing skins, silk, wool, and other fibrous materials. (A com.)
3198. R. A. Brooman, 166, Fleet-street—A new improved method of preparing silk fabrics to be employed in the manufacture of hats, caps, and bonnets. (A com.)
3200. R. Wailes, Brighton—An improved tool or apparatus for cleaning windows and glasses.
3201. T. Green, Leeds, W. Green, 11, Brunswick-place, Leeds, and R. Mathers, Trafalgar-street, Leeds—Imp. in lawn mowing, rolling, and collecting machines.

Dated 21st December, 1861.

3204. J. Wakefield, Birmingham—Imp. in sewing machines.
3209. W. L. Allchin and W. Allchin, Northampton—Imp. in apparatus applicable to the superheating of steam.
3211. F. Selby, Surbiton, Surrey—Imp. in boilers for the generation of steam in engines for applying steam for motive power purposes, and in wheels and ways for steam carriages to run on.
3212. W. Kempe, Holbeck Mills, Leeds—Imp. in scrays or tables applicable to gig mills, brushing mills, and other like machinery.
3213. C. Osman, Chryssall-road, Brixton—Imp. in the manufacture and application of elastic or yielding surfaces for sitting, lying, or reclining upon.

Dated 24th December, 1861.

3214. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for cleaning wheat and other grain. (A com.)
3215. L. R. Bodmer, 2, Thavies-inn, Holborn—Imp. in looms for the manufacture of sacks, knapsacks, mattress cases, and other goods. (A com.)
3217. J. Rosindell, Mile-end, Middlesex—An improved method of and apparatus for separating solid from liquid substances.
3219. E. Ede, 7, Abercorn-mews, Violet-hill, St. John's-wood—Imp. in the construction of horse shoes.
3220. J. F. Harvey, 145, Strand—Imp. in umbrellas and parasols.
3223. E. B. Sampson, Ham Mills, Stroud—Imp. in apparatus for drying wool and other fibres and substances.
3224. J. B. Wood, Broughton, near Manchester—Imp. in the manufacture of driving straps or bands, the backs of wire cards, and cop tubes.
3225. F. Laurent and J. Casthelaz, 19, Rue Ste. Croix de la Bretonnerie, Paris—Imp. in the manufacture of colouring matters.
3226. J. Cochrane, Dudley—Imp. in apparatus employed in sinking cylinders and open coffer for forming foundations under water.
3227. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in the arrangement of traction and connecting apparatus for railway carriages and trains. (A com.)

Dated 26th December, 1861.

3230. T. Standing, Preston—Imp. in cinder sizers and ash receptacles applicable to domestic fire grates.
3232. J. Schloss, Cannon-street—Imp. in envelopes for containing photographic portraits and pictures. (A com.)
3234. J. Shepherd, Manchester—Imp. in apparatus for cleansing steam boilers.
3235. R. Needham, Dukinfield, Cheshire—Imp. in apparatus for cleansing steam boilers and lubricating the pistons of steam engines, and for an improved steam trap.
3237. J. N. Palmer, Fenchurch-street—Imp. in cooking stoves and ships' ranges. (A com.)

Dated 27th December, 1861.

3238. W. Hawksworth, Oldham—Certain imp. in carding engines.
3239. T. Silver, Philadelphia, U.S.—Imp. in apparatus for governing or regulating the speed of steam and other engines.

3242. T. Bright, Carmarthen—Imp. in machinery for cutting hay, straw, and other vegetable substances.

3244. W. E. Newton, 66, Chancery-lane—Imp. in steam generators. (A com.)
3245. J. McIntyre, New York—Imp. in bomb shells and similar projectiles.
3247. J. J. H. Fajole, and P. A. Agostini, Courbevoie—An improved composition or improved compositions suitable for painting, varnishing, and coating.

Dated 28th December, 1861.

3248. J. W. Harland, Chorlton-on-Medlock, near Manchester—An imp. or imps. in the manufacture of wood and other types or substitutes therefor or furniture used by letter-press printers.
3249. E. Lord, Todmorden, Yorkshire—Certain imp. in machinery for preparing cotton and other fibrous substances.

Dated 30th December, 1861.

3252. J. P. Dormay, J. S. Aikenhead, and T. Johnson, Wandsworth—Imp. in the construction of boats for sailing or rowing.
3253. J. Edwards, 77, Aldermanbury—Imp. in the permanent way of railways.
3256. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in apparatus for raising or forcing water or other fluids. (A com.)
3257. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of cube sugar. (A com.)
3259. A. I. Austen, Millwall—Imp. in the manufacture of night lights

Dated 31st December, 1861.

3261. A. Macnair, 34, Southampton-buildings, Chancery-lane—Imp. in axle boxes for railway carriages. (A com.)
3263. T. Green and W. Green, Leeds, and R. Mathers, Trafalgar-street, Leeds—Imp. in chains for giving motion to chain wheels, and in giving motion to machinery.
3267. W. Spence, 50, Chancery-lane—Imp. in deflectors for lamps. (A com.)
3269. W. H. Bailey, Salford—Certain imp. in sewing machines.
3271. W. E. Newton, 66, Chancery-lane—Improved apparatus for boring rocks and other mineral substances. (A com.)

INVENTION WITH COMPLETE SPECIFICATION FILED.

36. G. T. Bousfield, Loughborough-park, Brixton—Certain new and useful imps. in machinery for propelling water craft. (A com.)—4th January, 1862.

PATENTS SEALED.

[From Gazette, January 14th, 1862.]

January 11th.		January 14th.	
1767. T. Smith and G. Taylor.		1834. M. Henry.	
1772. T. Coble.		1795. J. H. Butterworth.	
1773. T. Coble.		1796. J. H. Butterworth.	
1774. R. Taylor and T. Price.		1826. W. E. Newton.	
1775. J. C. Coombe & J. Wright.		1827. E. T. Hughes.	
1776. T. Coble.		1838. J. B. Wood.	
1777. B. Browne.		1839. W. Wood.	
1779. J. H. Johnson.		1846. R. Thompson.	
1788. J. Blinkhorn.		1858. A. Wood.	
1789. R. Jones.		1871. C. Robertson.	
1793. W. Palmer.		1921. J. E. Drouet.	
1807. B. Johnson and W. H. Anderson.		1932. P. O'Hanlon.	
1810. P. Williams and T. Parkinson.		1867. L. W. Viollier.	
1814. J. W. Rogers.		2031. J. Bethell.	
1816. D. Gallatent.		2073. T. Sutton.	
1818. P. Shaw.		2093. W. Richards.	
1819. R. Laing and G. H. Cossins.		2335. J. C. Coombe & J. Wright.	
1820. R. C. Newbery.		2358. G. T. Bousfield.	
1824. R. A. Brooman.		2360. G. T. Bousfield.	
		2379. W. E. Wiley.	
		2555. A. V. Newton.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, January 10th, 1862.]

January 6th.		January 7th.	
88. F. Versmann and A. Oppenheim.		69. J. T. Foster.	
95. J. Gibbons.		132. R. Mushet.	
126. J. Daughish.			
198. B. Lauth.		January 8th.	
		141. W. E. Newton.	

[From Gazette, January 14th, 1862.]

January 9th.		January 10th.	
74. T. J. Claxton.		81. J. Biers, jun.	
80. C. M. Kernot.		January 11th.	
89. N. P. Burgh.		103. C. Beslay.	
98. W. McNaught and W. McNaught.		108. H. Critchley and S. Elston.	
121. T. Sampson.		113. J. J. Stevens.	
		114. F. J. Manceaux and N. Veillard.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, January 10th, 1862.]

January 8th.
72. A. Robertson.

Journal of the Society of Arts.

FRIDAY, JANUARY 24, 1862.

NATIONAL MONUMENT TO HIS LATE ROYAL HIGHNESS THE PRINCE CONSORT.

The Council have passed resolutions to the effect that the members of the Society be invited to subscribe to the above object, and that the Financial Officer receive such subscriptions, and that they be published in the Society's *Journal*.

The following has been addressed to the Institutions in Union :—

Society for the Encouragement of Arts, Manufactures, and Commerce,
John-street, Adelphi, London, W.C., Jan. 23, 1862.

SIR,—The Council of the Society of Arts have considered that it would, doubtless, be agreeable to members of Institutions in Union to join in the subscription for a National Monument to the Memory of the Prince Consort, such Memorial, both in design and execution, being approved by her Majesty the Queen; and I have been instructed to address the Institutions on the subject.

The Council feel that the Society of Arts, as well as the Institutions in Union with it, are under special obligations to their late President, for his wisdom and patronage in the promotion of Education, Science, and Art, and they suggest that some steps should be taken to enable the members of Institutions to subscribe, feeling assured that all will be glad of the opportunity of testifying to the Queen, in sums however small, their sense of the great services of the late Prince.

I shall be obliged by your letting me know what has been done, and by your reporting to me, for publication in the Society's *Journal*, the total amount subscribed. Wherever an individual subscription amounts to five shillings, the name of the subscriber may be sent for publication.

I am, Sir,

Your obedient servant,

P. LE NEVE FOSTER,
Secretary.

The officers and workpeople at Price's Candle Company, in London and Birkenhead, have set an example, worthy to be followed by those employed in other large establishments, by subscribing £30.

Mr. George Wilson, the manager, in sending the amount, says:—

"Since the Rifle corps, we have had nothing which has brought out nearly so strong and unanimous a feeling among our people as the Prince Consort Memorial. This contribution represents the feelings of about 1,500 men, boys, and girls, who have contributed in sums from a halfpenny upwards."

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the

aggregate to £443,700, have been attached to the Deed.

Guarantors holding ivory tickets for visiting the building are informed that those tickets are not available for any Saturday after the 1st of February.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The progress of each week is more and more convincing of the entire suitability of the building for an Art and Industrial Exhibition. The main object for which it was intended seems never to have been absent from the mind of the architect, and the small faults which public critics are so delighted to discover, are, when candidly discussed, and if faults at all, found to arise from the necessary requirements of each particular portion.

The Picture Galleries, as regards the three great requisites, of space, lighting, and ventilation, are pronounced, by common consent, to be the finest ever constructed, while the nave, transepts, courts, and annexes, will be found respectively to be more suited to the exhibition of different objects of industry than any other buildings erected for a like purpose.

The domes are advancing with great strides. In the eastern the sash-bars are being put in their places, and in the western all the ribs are fixed, as well as a great portion of the cross-bracing. The roof has been erected over both ends of the Refreshment Courts, and in one place slating has commenced. The flooring also of the first story is being laid. The great staircase behind the central entrance is in course of erection, as well as the smaller ones at the corners of the domes which give access to the nave galleries.

In the British portion of the building Her Majesty's Commissioners have so far completed their arrangements as to indicate the spot which each class of industrial products is to occupy. To the colonies is allotted the north-eastern transept, while India fills the galleries above. In the great south-eastern court will be exhibited hardware and steel, with separate courts for Birmingham, Sheffield, and Wolverhampton; pottery, glass, musical instruments, precious metals, civil and military engineering, and naval architecture have also space in this part. Carriages are to be in the long corridor, under the eastern picture gallery. The north-eastern court will be mainly filled by furniture. The textile fabrics have space allotted to them in the southern galleries; and in those on the north side of the nave will be found stationery, watches, philosophical and surgical instruments, and dressing-cases, &c.

Her Majesty's Commissioners have adopted the following regulations with respect to the admission of visitors to the Exhibition :—

1. The Exhibition will open, as previously announced, on Thursday, the 1st of May, and will be open daily (Sundays excepted), during such hours as the Commissioners shall, from time to time, appoint.

2. The Royal Horticultural Society having arranged a new entrance to their gardens from Kensington-road, the Commissioners have agreed with the Council of the Society to establish an entrance to the Exhibition from the gardens, and to issue a joint ticket, giving the owner the privilege of admission both to the gardens and to the Exhibition, on all occasions when they are open to visitors, including the flower shows and fêtes held in the gardens, up to the 18th of October, 1862.

3. There will, therefore, be four principal entrances for visitors:—(1.) From the Horticultural Gardens for the owners of the joint tickets, Fellows of the Society, and other visitors to the gardens. (2.) In Cromwell-road. (3.) In Prince Albert's-road. (4.) In Exhibition-road.

4. The regulations necessary for preventing obstructions and danger at the several entrances will be issued prior to the opening.

5. Admittance to the Exhibition will be given only to the owners of season tickets, and to visitors paying at the doors.

SEASON TICKETS.

6. There will be two classes of season-tickets; the 1st, price £3 3s., will entitle the owner to admission to the opening and all other ceremonials, as well as at all times, when the building is open to the public; the 2nd, price £5 5s., will confer the same privileges of admission to the Exhibition, and will further entitle the owner to admission to the Gardens of the Royal Horticultural Society at South Kensington and Chiswick (including the Flower Shows and fêtes at these Gardens) during the continuance of the Exhibition.

PRICES OF ADMISSION.

7. On the 1st of May, on the occasion of the opening ceremonial, the admissions will be restricted to the owners of season tickets.

8. On the 2nd and 3rd of May the price of admission will be £1 for each person; and the commissioners reserve to themselves the power of appointing three other days, when the same charge will be made.

9. From the 5th to the 17th of May, 5s.

10. From the 19th to the 31st of May, 2s. 6d., except on one day in each week when the charge will be 5s.

11. After the 31st of May the price of admission on four days in each week will be 1s.

SALE OF SEASON TICKETS.

12. Season tickets are now for sale, between the hours of 10 and 5 daily, at the offices of her Majesty's Commissioners, 454, West Strand, London, W.C.

13. Applications through the post (stating Christian name and surname) must be addressed to the secretary, and must be accompanied by Post-office orders, payable to J. J. Mayo, Esq., at the Post-office, Charing-cross.

14. No cheques or country notes will be received.

15. Cases for preserving the season tickets may be obtained at the office for 1s. each.

SIXTH ORDINARY MEETING.

WEDNESDAY, JAN. 22ND, 1862.

The Sixth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 22nd inst., Austen Henry Layard, Esq., M.P., in the chair.

The following candidates were proposed for election as members of the Society:—

Bentley, Robert J.....	Furnival-park, Bawtry.
Brinton, John.....	Kidderminster.
Champion, Percival	Stamford-hill, N.

Countze, George	103, Long-acre, W.C.
Crisp, W. B.	81, St. John-street-road, E.C.
Evans, Anthony.....	34, Bloomsbury-square, W.C.
Hooper, J. K.....	20 and 21, Queenhithe, E.C.
Lahee, Samuel	17, Brompton-square, S.W.
Lendy, Captain A.....	Practical Military College, Sunbury, S.W.
Massey, Thomas.....	5, Gray's-inn-square, W.C.
Sim, William.....	1, Dane's-inn, Strand, W.C.
Spencer, Thomas	Newburn Steel Works, 5, Westgate-street, Newcastle-on-Tyne.
Wurtzburg, Edward	May-villa, Leeds.

The following candidates were balloted for and duly elected members of the Society:—

Alcock, Michael	The Windsor Bridge Iron Works, Manchester.
Aldred, Geo. Edwd., M.D.	14, St. James's-square, S.W.
Blaker, William Lamport	Bellevue, Worthing, Sussex.
Cartwright, H. C.	14, Manchester-square, W.
Cleverty, James John ...	16, Gloucester-place, Hyde-park gardens, W.
Dines, George.....	St. Anne's-hill, Wandsworth, S.W.
Evans, Jeremiah.....	33, King William-street, City, E.C.
Gould, Charles Augustus.	10, Winterslow-place, Vassall-road, Brixton, S.
Hansard, Luke Henry, B.C.L.	Westgate House, Arundel, Sussex.
Jones, Wm. Hibbs.....	4 and 5, Jewry-street, Aldgate, E.C.
Lawrence, Henry	High-street, Kensington, W.
Lindsay, Thomas	Mill-wall Brewery, Mill-wall, E.
Lucas, Charles	(Lucas Bros.) Belvedere-road, Lambeth, S.
Marcus, Henry Robert ...	40, Falkner-street, Liverpool.
Messenger, Joseph	9, Spring-gardens, S.W., and Folkestone.
Ridge, Edwin James....	6, Dorchester-place, Regent's-park, N.W.
Routledge, William	New Bridge Foundry, Adelphi-street, Salford.
Symonds, Captain, R.N....	10, Adam-st., Adelphi, W.C.
Wragge, Frederick	Stoke-on-Trent.

The following Institutions have been taken into Union since the last announcement:—

Southmolton Mechanics' Institution.
Ulverston Lecture and Scientific Association.
Bristol Provincial Trade and Property Association.

The Paper read was—

ON THE PRESENT ASPECT OF THE FINE AND DECORATIVE ARTS IN ITALY, WITH ESPECIAL REFERENCE TO THE RECENT EXHIBITION IN FLORENCE.

By Mr. DIGBY WYATT.

The name of Quintino Sella, the mathematician, economist, and orator, that of one of the most rising men of the present generation of Italians, will ever be held in esteem by his countrymen, if on no other grounds, from the honourable connection which must always exist between his memory and that of the signal manifestation of Italian capabilities, in an industrial point of view, which will mainly engage our attention this evening—the first made since the yoke which has so long impeded their satisfactory development has been at least partially removed from the shoulders of a race whose attachment to Fine and Decorative Art has become proverbial.

To the Cavaliere Sella, and to his exertions in the Italian Parliament, that nation is indebted for the conversion of an Exhibition, limited, as originally contemplated, to the illustration of Tuscan manufactures only, into one in which evidence, greater or less according to circumstances, is to be found of the artistic and industrial capabilities of almost every district of that united kingdom; whose existence as such, every well-wisher to the cause of liberty, and every one who honours the ancient traditions of excellence in design still treasured in that favoured land, must ardently desire should be preserved.

The task of the critic who would attempt to minutely characterise individual productions, so far removed from the eyes of those he may have to address, as to render impossible any appeal on their parts from his judgment to material evidence, must, it appears to me, be alike unjust to those whose works may be criticised, tedious to those addressed, and too one-sided to be either interesting or profitable. I propose, therefore, this evening to take a broader view of the entire subject of the Italian Decorative and Industrial Arts than I should probably do, if the means of rectifying any errors of individual judgment on my part were within the reach of those to whom I venture to offer the following observations.

The natural sequence of emotions most readily to be imagined as occurring to an educated Englishman on entering the Exhibition building at Florence would be, as it appears to me, somewhat as follows:—Firstly, his memory would revert to those old glories of the days of Florentine independence, of Genoese and Venetian magnificence, and of Roman Pontifical autocracy, in which the fine and decorative arts are known to have reached a pitch of perfection scarcely rivalled in the palmiest days of Greece and of the Augustan empire. He would inquire what those old Italian arts and industries were, how far they co-existed and were united, and under what social conditions they were developed.

His second inquiry would naturally be, how much of that ancient power still lingers in the hands of the descendants of those by whom the original greatness was attained?

The third subject of investigation would probably be, after taking stock of the present, what materials still exist amongst the Italians likely to carry to a higher perfection than has been as yet attained in recent times the arts for which "*Italia la bella*" was once so famous?

Recognising, as no one can fail to do, the retarding influences which have so long operated to fetter and depress the wonted vivacity of that highly imaginative people, it is an interesting problem to endeavour to trace the direction in which a greater degree of personal liberty than they have hitherto been permitted to enjoy may tend to revive those energies which have too long been overshadowed by a baneful condition of social oppression. From her past and her present may thus, to a certain extent, be augured an Italian future.

In all this, doubtless, there must be some moral for us; and the fourth aspect under which any Englishman, anxious for the augmentation of his country's greatness, would naturally regard the present evidences of capacity manifested at Florence, would be to consider what concurrent improvement his countrymen may derive from the lessons to be at present learnt in Italy?

Following this order of investigation, my remarks will be grouped in subordination to these four leading aspects, under which the subject may be regarded. We shall therefore consider first—and far too briefly for the grandeur of the theme—what the old Italian arts and industries were.

It appeared to those in whose hands the initiation of the Great Exhibition of 1851 rested, as likely to prove an important element in preparing the way for a due appreciation of that great display, that a collection of works, illustrating the perfection to which industrial processes had been carried in ancient and mediæval times, should be submitted for general study and investigation by the public, previously to their being called upon to estimate the

relative value of corresponding cotemporary processes. Many of those I have the honour of addressing cannot forget the success which attended that exhibition, inaugurated under the auspices, and mainly through the direct action, of the Society of Arts.

A similar idea seems to have struck the Italians, and to have led to the bringing together a very remarkable collection of specimens of ancient Italian technical art; mainly through the active exertions and public spirit of a Florentine medical man and distinguished connoisseur, the Doctor Guastalla, whose energy has already tended to infuse new life into the administration of the Florentine museums. Several of the princely Italian families co-operated in this good work, the proceeds arising from which, it was determined, should be voted to charity.

Within the walls of a large house in the new Piazza dell'Indipendenza, were consequently crowded together a great quantity of objects, illustrating almost all those industries with the choicest specimens of which Italy was wont, from the end of the 14th to the beginning of the 17th century, to supply the factitious necessities of the most highly cultivated portion of the royalty, aristocracy, and rich "*bourgeoisie*" of Europe.

With such examples of these arts as we may be now thankful to possess in the Museum at South Kensington, it is little necessary for me to dwell in detail upon the classes of objects collected in the Casa Guastalla. It may be sufficient to say, that bronzes worthy, if not wrought by the hands, of men, such as Ghiberti, Cellini, Donatello, Michael Angelo, and John of Bologna, were not wanting. Neither were the finest Venetian glasses, Milanese and Ferrarese arms and armour, Siennese and Florentine illuminations, Umbrian Majolica, enamels of various kinds, goldsmiths' work, silver repoussé work, iron work, niello, medals, *lavori di commesso*, or mosaics, and coins, cuir bouilli, tapestries, rare tissues, *lavoro all'Azzimina* or damascening, tarsia, or marquetry, and marble, ivory, and wood carving.

Where so much was beautiful, it seems almost invidious to dwell upon points of remarkable interest; but it would be treason to the royalty of excellence to pass over two or three objects especially celebrated in the history of art, and now brought under public notice after ages of seclusion, if not neglect.

The most interesting of all was probably that patera in bronze, which Vasari relates that Donatello worked for the noble Casa Martelli, to show how perfectly it was within his power to rival the exquisite fragments of antique bronze casting and chasing, which in his days were as much the rage among great Italian collectors, as Majolica and "*vieux Sèvres*" have been lately among French and English. As perfect almost as it could have been when it left the hands of that rare artist, this beautiful piece of sculpture justifies all the praises which Cicognara has so lavishly bestowed upon it in his "*History of Sculpture*."

Another specimen, of little less historical interest, was the bust in marble, representing Marietta Strozzi, wife of Celio Calcagnini di Ferraro, by that great sculptor, who unfortunately died too young to leave much behind him, Desiderio da Settignano. Jealously preserved in the family of her descendants in that palace, the architecture of which, by Benedetto da Majano and Pollaiuolo, has mainly stamped the Tuscan palatial style with its easily recognised distinctive features, there can be no doubt of the true descent of this beautifully preserved work of art.

Another item, small in bulk, though great in artistic value, was also contributed from the same collection—a little key in chiselled steel, ascribed to Benvenuto Cellini, and, if not actually executed by him, eminently worthy of his most dexterous hand, and of all that skill which he appears to have acquired in the workshop of Paolo Arsago, the Milanese.

Probably, as far as unique curiosity is concerned, the most interesting groups of objects in this collection, were the very important series of coins of different Italian cities

and mints; the medals of illustrious personages, by Pisanelli, Sperandio, Cellini, Pollaiuolo, and others; and a very curious collection of cut and stamped leather work, which the energies of the purchasers for the South Kensington Museum may, I hope, ere this have acquired for our admiration in this country.

Important as the objects in this collection unquestionably were, as filling up the detail of the still-life of those pictures, in which the stately Gonzagas, Medici, Sforzas, Strozzi, and Dorias occupied the foreground, it is of course in the great monuments and permanent museums of the country that we learn to recognise how inseparable the perfection arrived at in these minor arts was from that greater sublimity attained in the noblest efforts of the architect, the painter, and the sculptor.

It is precisely in this union of imagination of the loftiest kind with perfect technical dexterity in art productions, on either the vastest or the most minute scale, that the great strength of the excellence of the finest Italian design in old time consists. All these relics, whether taking the form of gigantic churches, of stately palaces, of heroic works of sculpture, of extensive frescoes, of elaborate furniture, of pottery, glass, and even ornamental leather, show how absolutely indispensable to personal enjoyment Art then was.

Every student of the "Divina Commedia" must remember the almost passionate terms in which Dante mourns over that transition from simplicity of life and manners to a luxurious indulgence of the intellect and senses, which no sumptuary laws, however stringent, were ever able to subdue. Long and vainly the nobles strove during the fourteenth and fifteenth centuries to preserve for themselves a monopoly in splendour, but wealth accumulating in the hands of the citizens ultimately broke up their ineffectual blockade. How, and with what results, may be traced in the chronicles of Villani and Corio; in the excellent "Discorso di Guglielmo Manzi sopra gli spettacoli, le feste, ed il lusso degli Italiani nel secolo XIV;" and in Muratori's grand collection of writers "rerum Italicarum."

Out of the superabundant gains of the industry and commerce of Florence, Sienna, Genoa, Venice, Lucca, Pisa, and Milan, and out of the accumulated riches drawn by an all-powerful priesthood from its spiritual tributaries in all parts of the world, one cannot fail to be struck with the very large proportion which was obviously expended in supplying this apparently insatiable craving for beauty. Sums of money which would frighten the nobles, commercial or hereditary, even of this kingdom, were lavishly expended on the great monuments of Italian art. Taking, for instance, such a city as Palermo, we find, even at the present day, not tens, but twenties and thirties of churches lined throughout with marble mosaic of the most costly description. The riches at St. Mark's, at Venice; St. Peter's, at Rome; the Certosa, at Pavia; St. Anthony, at Padua; and the churches of the Annunziata and San Matteo, at Genoa, appear almost beyond estimation; while not only in monuments such as adorn these cities are the boldest dimension and the grandest scale adopted, but every inch of wall surface, and every piece of church furniture, however insignificant, are made as elaborate as human ingenuity and human hands can make them.

To such an exuberant extent was this apparent craving for enrichment indulged, that where, as happened in many cases, funds were wanting to complete the ambitious designs of the founder of some great monument, his successors, rather than leave the work altogether unfinished, have endeavoured to realise by paint and every kind of ingenious expedient, the effect so ardently desired by the original founder of the edifice. Hence proceed many of those illusive perspectives which almost convert flat ceilings into airy cupolas, and carry out the eye of the visitor in the *salone* or grand apartment of the *piano nobile*, or principal floor of an Italian residence, through apparently interminable arcades, to an exuberant landscape, alive with statues and fountains.

An amusing definition of what an Italian of the 16th

century understood as indispensable domestic ornaments may be found in a little book written by Castiglione Saba, and entitled "Ricordi overo Ammaestramenti," for a reference to which, and indeed for the loan of which, I am obliged to the kindness of Sir Charles Eastlake. In one chapter the writer tells us, how pleasing to the eye and how necessary are *terra cotta*s by such men as Paganino da Modena; musical instruments by Lorenzo de Pavia, or Bastiano da Verona, that carvings should be supplied by Michael Angelo, Donatello, Alfonso Lombardi (one of the great Venetian Lombardi), and Cristoforo Romano. Antique medals, he says, are necessary, as well as those of Giovanni Corona, of Venice. Verocchio and Pollaiuolo, we are told, should supply the bronzes; and cameos and intaglios should be by Pietro Maria, and especially by Giovanni di Castello.

We may pass over the list of worthy painters given by the author, but not so the terms in which he notices the marquetry works of Fra Damiano da Bergamo, and the armour and glass work, the current productions of Milan and Venice. To fittingly supply such necessities no artist was too proud, and there yet exist, more particularly in the great Florentine collection of drawings by the old masters in the galleries of the Uffizii, ample evidences of the powers in designing ornament, as applied to industrial productions, possessed by artists whose more special fame rests upon that which we habitually contradistinguish from such classes of art, by designating as fine art. To enumerate a few of these may not be unprofitable, by way of directing the attention of young artists to some of the worthiest masters of their craft.

As designers of wood and marble carving we note the names of Baldassare Peruzzi, the great Siennese architect; Giorgio Vasari, Raffaele, Da Monte Lupo, Michael Angelo, Montorsoli, Guglielmo della Porta, Il Riccio (the author of the magnificent candelabrum in bronze at the Church of St. Anthony, at Padua), Giovanni Battista Trotti, better known as Il Molosso, Lilio da Novellara, and an artist of exquisite refinement, Francesco Salviati. For stucco work we meet with designs by Giovanni Battista Cremonini, and Marco da Faenza; and for friezes with those of Gaudenzio da Ferrara, Giulio Campi, and Amico Aspertini. For miscellaneous designs of all kinds, we find beautiful studies by Pierino del Vaga, Francesco Zuccheri, Polidoro da Caravaggio, and Prospero Fontana. Cellini, Bernardino Pochetti, Giulio Romano, and many others, brought their great accomplishments to bear upon the production of beautiful metal-work, while Pellegrino Tibaldi, Matturino, Morto da Feltro, Giovanni da Udine, Bacchiacca, Pinturicchio, Pietro Perugino, and many others, shone in arabesques and cognate descriptions of design. Their ability indeed, to minister to the smaller wants of the great Italian nobles, led, in many cases, to the artists so exercising their lesser talents (if they may be so described) receiving commissions calculated to bring out their capabilities in the loftiest directions.

Any one desirous of tracing the important part which the requirements of industrial art played in the lives of many of the most eminent Italian artists, and which I cannot now do more than point to, may find ample materials awaiting his investigation in the autobiographies of Ghiberti and Cellini, in the writings of Vasari and Baldinucci, in the "lettere Sanese" of della Valle, in the Italienische Forschungen of Von Rümohr, in the Beiträge zur neuern Kunstgeschichte of Förster, and last, not least, in the collections of original notes and documents illustrating the history of Italian art, by Gaye, Gualandi, Carlo Pini, and the brothers Milanese.

Did time permit, I would willingly dwell in detail on Mosaic, Sgraffito, Intarsiatura, Fresco, and Gesso painting; Terra Cotta, Majolica, Stucchi, Niello, glass making, and others of those arts, transmitted by the curious MS. treatises known as "secreta" from generation to generation, in which Italy so long enjoyed a monopoly of celebrity, if not of actual production; but I feel that the second branch of our inquiry this evening is too important

to be set aside for matters even of such interest as I do not doubt these ancient arts of Italy might be made to assume.

Turning from their yesterday to their to-day, we cannot but observe that, in almost every department in which their ancestors excelled, the modern Italians exhibit, if not a considerable power of production, at least very respectable exceptional proficiency; and if not within the walls of the Florentine exhibition, at least in contemporary art-productions elsewhere, we may trace a partial revival of almost every ancient process known to the Italians of Medicean times.

It is probably in the purely Fine Arts that the principal degeneracy is to be recognised; in the strictly technical there exists by no means the same falling away. The reason for this may not be hard to trace, in the amount of liberty which has for many years past been enjoyed by the lower orders, as compared with that moral and mental subjection in which the middle classes have been held. While every-day necessity, and the passage of interminable "forestieri," have created sufficient demand to stimulate the capabilities of the workmen, the apparent hopelessness of their careers has unquestionably deterred many, who from the middle classes, would have supplied proficient artists and designers, from entering upon those severe studies by which alone excellence in the higher branches of art can be attained.

To proceed with some little method, it will be well to take first of all the three generally received fine arts—Architecture, Painting, and Sculpture; and then the leading art-industries in succession, noting briefly the apparent condition of each, in Italy, at the present date.

With regard to Architecture it may be observed that the pernicious influence exercised by Bernini and Borromini, whose trivialities obtained excessive vogue during the greater part of the 17th century, tended to the production of that *rococo* style which caused a great deterioration in the florid ornament of the Roman, Venetian, and Northern Italian schools. But, extravagant as Bernini was, it would be unjust to deny that he frequently redeemed his excesses, as in the colonnade of St. Peter's and in the Church of St. Agnese, in the Piazza Navona, at Rome, by great facility of design and a certain not un-noble bravura of style. Borromini's great follower, Guarini, out-Heroded Herod, and demonstrated, by an *argumentum ad absurdum*, the ridiculous consequences of adopting the whimsicalities of Borromini.

The brilliant talents of Vanvitelli, and the majestic scale upon which he worked out the immense Palace at Caserta, tended to maintain the dignity of his art during the greater part of the 18th century; and showed that magnificence and grand conceptions of pictorial effect had not yet deserted Italian architecture. From his death, in 1773, architecture, and ornament also, greatly declined; and although monuments upon a large scale have been frequently erected since that period in Italy, but few of them are worthy, in any quality excepting that of scale, to rank with the purer taste of earlier times.

The feeble classicisms of the style of the Empire were generally slavishly reproduced in Italy during the early part of the present century; and until comparatively recent days little of considerable merit has been executed.

The works of Piranesi, Albertoli, Cicognara, and Canina, and the illustration principally by foreigners (such as Percier and Fontaine, Mazois, Grandjean, Famin, and Montigny, Gauthier, Letarouilly, Zahn, Gütensohn, and Thürmer, Grüner, Taylor and Crecy, Willis, and Hessemer) of their great monuments of art, have led to a return to a purer class of architectural ornament than had been previously in vogue; while the earnest writings of the Count Selvatico, and the translation of Rio's "*Poésie Chrétienne*," have introduced to the Italian architects those rational principles of design, including the treatment of constructive form and of ornament, originated amongst us by the younger Pugin.

The great scale of the existing edifices, and the repara-

tions which it has been necessary to make from time to time to save them from destruction, have constantly maintained Italian artisans in the practice of rivalling the ancient work; so that in every department of building, hands at least abound, perfectly capable of carrying out the most difficult designs.

No better illustration of this abundant material power could probably be given than the rapidity and dexterity with which the buildings for the Exhibition were adapted to their present purpose in a few weeks only, under the skilful direction of the architects, Signori Presenti of Cortona and Martelli of Florence.

The feeble academic system which has until recently prevailed, and under which the professorial chairs were not unfrequently occupied by political parasites, rather than by duly qualified professors of real abilities—coupled with the lack of occupation—has certainly enfeebled the powers of the last generation of architects in Italy, although there are, of course, some honourable exceptions to such a reproach.

Among them I would place conspicuously the Cavaliere Niccolò Matas, of Florence, who is now on the eve of completing a work which must for ever do honour to his country. I allude to the restoration of the façade of the Church of Santa Croce, which is being conducted upon a scale of nobleness, worthy in every respect of the building in which are deposited "ashes," which, as Byron says, are in themselves "an immortality of dust." The whole of this work, which is of enormous extent, is carried out in different-coloured marbles, wrought with an exactitude worthy of the celebrated masonry of the shrine of Orcagna, in the Or San Michele, so highly praised by Vasari. The sculpture is being executed by the most distinguished sculptors of Florence, and the result of their combined abilities is such as could scarcely, I believe, be rivalled at the present time, by designers, artists, and workmen in any of the capitals of Europe.

Scarcely less praise should be awarded to the authors of the noble restoration, now making, of the Bargello at Florence—the old palace of the Podestas.

Very recently a programme has been put forth, inviting designs from Italian and other artists, for completing the façade of the cathedral at Florence. The greatest praise is due to the Italians for their earnest desire to remedy so great a blot as the incomplete state of this façade has always been to that noble building, Santa Maria del Fiore, the master-piece of Arnolfo di Lapo and Brunelleschi.

In the Exhibition, under the head of "Building Materials and Contrivances" but little was worthy of remark, with the exception of the terra cotta, which was, generally speaking, very good, more especially in the article of stoves, and vases for garden decoration. There are some successful imitations of the works of Luca della Robbia, as well as of the glazed and coloured tiles attributed to Girolamo della Robbia. To these we shall, however, return under the head of ceramics. There are some interesting collections of marbles and building stones, and some very excellent scagliola. No less than four exhibitors received prizes for the production of hydraulic cements—an article, until recently, despite their Pozzolana, scarcely manufactured in Italy. An imitation of marble, made with cements of this description, and admirably coloured, has been perfected by the Marchese Campana, of Naples, and several specimens of his skill have been purchased for the South Kensington Museum. A manufactory of parquetry, on the Swiss system, has been lately established at Florence, and very fair specimens of flooring are exhibited.

Of decorative painting as applied to architecture, I observed no specimens in the Exhibition, but in the streets and houses quite enough to assure me that very great dexterity was common among men little raised above the class of ordinary house painters.

For more elaborate decorations, we know, from the skill of Signor Abbate, the decorator of the Pompeian house in the Crystal Palace, in this country, how readily competent directors may be found; and it would, I think, require very

acute observation on the part of anyone inspecting the old arabesques by Pierino del Vaga, in the Villa Doria, at Genoa, and the grotesques executed in the same building, by Annibale Angiolino, of Perugia, now living, to distinguish between the old and modern work.

Of the architectural designs in the Exhibition I am sorry to be unable to speak in laudatory terms. The most industrious amongst the artists appear to be Niccolò Bregaglia and Panfilo Rosati, of Naples, who produce many drawings of architectural fragments and restorations from Pompeii, executed in the French Academic style. In the remainder there is but little merit, although in water colour drawings there is evidence of considerable command over the delineation of architectural form.

The modern paintings of the Exhibition have been so fully and ably commented on in the pages of the *Times* by Galenga's brilliant pen; of the *Athenæum*, by Mr. Trollope, and of other journals, that I do not propose to dwell at any length upon them, but would simply remark that the old school of David and the classicists, as represented in Italy by Camuccini, and to a certain extent by his rival, Benvenuti, appears rapidly dying out; and in place of the well-drawn, but artificially grouped and badly coloured, gallery pictures, such as many of those of the late Professor Bezzuoli, of Florence (one of which figures in the place of honour in the great gallery of the Exhibition), *genre* and landscape paintings, less carefully drawn, but embracing more romantic incident, livelier action, more natural effect, and far better colour, appear to predominate.

There are, however, two large gallery pictures which merit the highest possible commendation. One is, "The Expulsion from Florence of the Duke of Athens," by Professor Stefano Ussi, which is a noble historical picture; and the other a picture of great power, by Domenico Morelli, of Naples, called "The Iconoclasts"—the subjects of both, it will be seen, rendering tribute to the importance, the one of political, the other of spiritual, liberty.

Among the best of the pictures of less pretension than these two, may be noted, "The Procession of the Burial of Buondelmonte," by Altamura, of Naples; two other pictures by Morelli; "The Council of Ten in the Courtyard of the Palazzo Ducale, on their way to the Hall of Council," by Celintano, of Naples; "Some Incidents of the War," painted by Carlo Ademollo, of Florence; and "The Battle of Magenta," by Induno, of Milan, a smart *souvenir* of Vernet. Of the Neapolitan school one has to remark the specially improved character of the colouring and mode of painting.

For the same reason that I have so summarily disposed of the paintings in the Florentine Exhibition, I would refrain from entering into detail upon the subject of Sculpture; but as, proportionately, the monuments in the latter art are of a superior quality to the evidences of ability presented by those of the former, I think it but just to indicate a larger number of those works which appeared to me to possess distinguished merit.

To say that the spirit of Canova is yet dead in Italy would be incorrect; but one is happy to recognise that, while much of his effeminaey and artificial composition are disappearing, much of his beauty of form and delicate finish in marble working are satisfactorily preserved. The care he bestowed in modelling the articulations of limbs, and the extremities generally, is rivalled in most of the best works now exhibited, although some few, otherwise excellent, fail in those important details.

The work which has attracted most attention, and with good reason, is the well imagined and gracefully carried-out figure of "A Girl Reading," by Pietro Magni, of Milan. That sculptor, with Strazza (the author of the "Ishmael," in the Exhibition of 1851), and Vela, of Milan, an artist of great talent, may be looked upon as leading representatives of the Romantic school of sculpture in Italy, as opposed to the more Academic style, which finds its ablest representatives in Cambi, Santarelli, Costoli, and Fantacchiotti.

Dupré, of Florence, a sculptor of very great power,

partakes of the merits of both classes, but falls slightly, in some of his works, into that leading defect of inattention to pure beauty of form with which the Romanticists, in aiming at expression rather than the "beau idéal," may be occasionally reproached.

The most absolutely Canovesque of sculptors is, apparently, De Fabris, (lately deceased), whose "Love and Psyche" is one of the homied but feeble reminiscences of the subject so dearly loved by his master, the father of modern Italian sculpture.

It is to be regretted that Tenerani, of Rome, Canova's favourite Italian pupil, has not contributed to this Exhibition, since his great powers would have gone far to vindicate the school of that really fine artist, under whose influence Tenerani's best works have been produced.

The principles upon which I believe the popularity of Magni's statue of the "Girl Reading" is founded, appear to me so important, and, indeed, so novel in their application to modern sculpture, that I think it my duty to dwell for a few minutes upon them. A maiden, of no great pretensions to beauty, either of form or feature, and in the simplest dress, is represented, seated on a common rustic chair, reading. There is no very great study evidenced in the arrangement of the lines either of the figure or of the draperies, and, indeed, in one important particular, the modelling of a portion of the bosom, a manifest defect is to be observed. The head is very truthfully modelled, and the expression is one of quiet concentration on the theme of the volume, in the study of which the reader's whole attention seems to be absorbed; that theme being, as may naturally be imagined, at the present juncture, the development of Italian liberty under the sovereignty of Victor Emmanuel. Such elements may not in description, perhaps, appear likely to result in the production of a striking work of art; and yet the power of this small statue is such as to arrest and enchain the attention of every one coming within sight of it.

The potency of the spell I believe to mainly consist in the concentration of purpose manifested in the whole composition. There is no straining for effect—to borrow a theatrical phrase, "no playing to the foot lights"—and none of that coquetry, half-conscious of nudity, and evident flirting of the damsel with the spectator, which disfigure so many ordinary representations of female form. Other charms are unquestionably the ease, nature, and simplicity of the whole arrangement. Nothing is allowed to interfere with the tranquillity of the action, and such is the effect of this appearance of quiet, that almost instinctively the spectator treads, as he passes, with lighter foot, and speaks in "hated breath," lest he may startle the marble maiden who sits wrapt in her brooding fancies, as it were, unconsciously before him. A second of Magni's works, "An Indian Mother," seated in a shawl swung over the branches of some trees, in such a manner as to make the figure appear entirely unsupported, is a *tour de force* in marble working, the slight tendency to extravagance in which is to be overlooked in the elegance of the action and the careful modelling of every portion.

A third work, by the same sculptor, is of considerably less merit. It represents a statue of Socrates, and, whether intentionally or not on the part of the artist, conveys an almost instinctive reminiscence of what one cannot but fancy the sovereign of United Italy himself might be with little else upon him than a rather scanty shirt. The compliment, if it be meant for one, is indeed somewhat dubious.

Vela, another Milanese, contributes one figure only, and that of an almost too voluptuous cast of beauty and attitude—"Spring," a nymph bounding upwards, but, as it were, caught, and entangled in the vernal flowers from which she seems to be rising. In delicacy of modelling, and that truthful rendering of flesh in marble, which the Italians term *morbidezza*, there is nothing, I think, in the whole Exhibition to equal it. It is to be regretted that other works of Vela's are not to be found at Florence.

The most ambitious figure is certainly the "Daughter of Zion in her desolation," by Morelli of Leghorn; but in aiming at grandeur the sculptor has neglected beauty, and thus fails to engage the sympathies of the spectator.

Fantacchiotti of Florence, who enjoys a great and deserved local reputation, exhibits several works of very considerable merit, the best being the monument to the late wife of Mr. Spence, an English artist, long resident at Florence. The figure, which is that of a very beautiful matron, is represented as extended, after the manner of some of the finest of the cinque cento monuments, on a bier, recalling, in many particulars, the general form of the ancient sarcophagus. In front are amorini, and beneath are square tablets, inserted, as it were, in a plain and well-designed pedestal. The special merit of this work is two-fold. In the first place, all that may be called pure sculpture,—that is the representation of the human form, and the draperies and ornaments connected with it—is thoroughly good; and in the second, these elements are combined with such conventional lines, masses, and ornaments, as adapt the whole composition for alliance with whatever may happen to be the architectural forms of the structure in which this beautiful work may be destined to be placed. What the consequences of the common want of skill in similar combinations may be, it is scarcely necessary to point out to an audience whose remembrances of St. Paul's and Westminster Abbey would, probably, be too poignant for me to do more now than hint at them.

Strazza, whose "Ishmael" in the Exhibition of 1851, and whose "Audace" in the Crystal Palace, have made us well acquainted with his capabilities, fails to sustain them at Florence in his statue of the "Sposa Novella," which has however received the compliment of purchase by the king. Neither strikingly beautiful nor very expressive of its title, the modesty of the recent bride seems rather of that affected class, the freedom from which I have already commended in Magni's masterpiece.

Santarelli, of Florence, a well-known artist, exhibits a "Shepherd Boy," which has merit, but his "Magdalen" is too close a reminiscence of that of Canova, and fails to sit up comfortably. The infant's "Prayer of Innocence" is offered up rather by a little man than by a true bambino.

The same reproach as to want of youthfulness in form maybe applied to the "Amore Mendicante" of Cambi, the general intention and action of which, however, are clever and expressive. The same sculptor's "Eve" recalls far too much and too many of the leading defects of our English academician Bailey.

Pierrotti of Milan exhibits a very good anatomical study, in the shape of "A Hunter Killed by a Snake." The subject is a difficult one, and has been well mastered by the skill and knowledge of the artist.

In the true academic style, Costoli's "Death of Menecæus" is to be highly commended, as being thoroughly well modelled, and well balanced in a difficult pose. His "Charity," a large bas relief, is by no means so good.

Dupré shows a "Mater Dolorosa," the character of which is sublime and devotional in a high degree. He has also a "Sappho," in an attitude not altogether dissimilar to, although in no way plagiarised from, that of the well-known work of Pradier; and a sculptured pedestal for, apparently, a large flower basin. The modelling and composition of the figures in alto rilievo which decorate the latter, it is no small praise to say are, I consider, fully equal to those we so much admired in Professor Drake's pedestal in the Great Exhibition of 1851,—a somewhat similar work. The attitude and expression of the "Sappho" and the draperies are admirable, but some portions of the nude have been modelled from rather too low a type of female beauty to be altogether satisfactory in a work of ideal art.

Admitted into the fellowship, if not the nationality, of Italian sculptors, are the well-known American and English artists, Power and Fuller. The "Greek Slave," and "Youth holding a Shell," the Proserpine, and many

admirable busts by the former, are too well known in this country to need dwelling upon; but with his "America" we are not so well acquainted. Unlike the life and vivacity of that population, whose every breath it appears must be drawn in an atmosphere of sensation, and whose vital energies seem inexhaustible, the embodiment of the sublimated essence of modern republics is tame and dead; but, like at least the major section of that unhappy continent, she stands but feebly and tottering, and one touch only seems wanting to overthrow the unstable goddess.

By the latter artist (Captain Fuller), there is a remarkably good figure of a "Drowning Boy," admirably modelled, and full of energetic action. The tempest-tossed sailor lad still struggles, though evidently unavailing, with the elements which overpower him.

This scanty list by no means exhausts the excellencies, or perhaps rightly points to the salient defects, of the really fine collection of works of sculpture, which it is not too much to say formed the leading feature of the Florentine Exhibition; but I feel that it is necessary to quit the field of pure sculpture for that application of the art which lends its highest graces to industrial production.

The two most distinguished workers in this department of industry, worthy maintainers of the fame Brustolone acquired for Italian wood-carving in the last century, are well known in this country—Barbetti and Pietro Cheloni, of Florence.

The former exhibits a grand door, carved with no less than 29 alto-relievos, of biblical subjects, treated some what after the manner of the celebrated gates of Ghiberti. Unlike them, however, the sculptures under notice have been executed in walnut wood, as a commission for Prince Demidoff, for the entrance door to whose Russian chapel at San Donato, near Florence, they are intended. The general design is, it appears to me, monotonous, from its extreme rectangularity, and is ill arranged in the junctions of the vertical and horizontal divisions with the semi-circular head of the door. The carving is, however, executed in so masterly a style as to constrain an admiration for the details, which fails to be excited by the general aspect of the whole.

The same artist contributes a large oak bench, the seat of which is hinged, in order that the lower part may answer the purpose of the *cassapanca*, which formed so leading a feature in the Italian interiors of the quattro and cinque-cento periods. In general design this work is better than the door just referred to, and leaves behind a feeling of more entire satisfaction.

The capability for the most important works, shewn by these productions, is destined to be put to an even loftier purpose, since Barbetti and his sons are now engaged in the execution of a magnificent case, 6 feet 6 inches high, entirely wrought in ivory and ebony, to hold the National Crown of Italy. Of this grand work a full-sized water-colour drawing was exhibited, and I fully believe that the realisation of the design (which is exceedingly good) will be not unworthy of the ancient glories of Italian ornamental carving.

Cheloni works in a manner which very perfectly reproduces the delicate handling of Mino da Fiesole. Civitale da Lucca, and Andrea Ferrucci, and proves that, with judicious encouragement, he may become a formidable rival to the most distinguished amongst the Parisian magnates in the production of luxurious furniture. His bookcase, —and above all, a single little panel in wood, fully justify this assertion. It is to be hoped that this fine bookcase, as well as the case for containing the National Crown, by Barbetti, may form ornaments in our Exhibition this year, where they cannot fail, I think, to be greatly admired.

The only rivals, although there are, of course, many approaching the excellence of Barbetti and Cheloni in ornamental carving, are Antonio Superchi, of Parma, and Professor Giusti, of Sienna. The former exhibits only a small panel, carved in soft wood, with arabesque ornament.

It is, however, a masterpiece. The latter works in ivory, and appears to be well supported by English patronage, since his miniature reproduction of the celebrated Fountain of Jacopo della Quercia at Sienna, and his exquisite little picture frame, have been produced, the former for the Earl of Northesk, and the latter for the Marquis of Northampton. For the Count Agostino da Gori, Giusti has wrought a little coffer or box to contain autographs of men of science, artists, poets, &c. The shrine is by no means unworthy of the relics.

Time will not permit of my dwelling at greater length upon individual specimens, or even extending my catalogue of ingenious artists. It may suffice to say, briefly, that in marble, stone, ivory, ebony, and plastic compositions, the application of sculpture to industry forms, probably, the most distinguished feature of the industrial portion of the Florentine Exhibition.

It would be unfair to the Italians to pass from the subject of applied sculpture, without noticing one form of it in which, from classical times to the present, they have maintained a decided pre-eminence over other nations. I allude to the art of working in gems and precious stones.

The names of Girometti and Odelli of Rome, are celebrated, and their productions still command very high prices; in proportion, perhaps, to the labour, but too great for the art displayed: as for instance, the single cameo of Signor Girometti is valued at no less than 30,000 francs, or £1,200, a price, possibly, as the Italians say, "da combinarsi." Neither of these artists, in my judgment, sustains his previously acquired reputation, while the intaglios of Berini of Milan, a less known man, are, if not so valuable, far more agreeable, being both designed and wrought in better taste, and rather reproducing Grecian than ancient Roman styles of execution.

The old celebrity of Valerio Vicentini for the execution of intaglios in crystal, resting not only on the warm tribute of admiration paid to his genius by Vasari, but on exquisite relics of his skill still preserved at Naples, Rome, and Florence, has excited the noble emulation of Beltrami of Cremona, a very beautiful specimen of whose handicraft is exhibited by the Brothers Turina. I believe Beltrami to be no longer living.

The medallie art of Italy, so famous of old through the dies cut by Cellini, Bastiano Cennini, and others, is well sustained in the present day, and the specimens furnished by the mints of Florence and Rome show that their ancient dexterity has not entirely deserted their descendants.

Before altogether quitting the Fine Arts, there are some forms in which they appear so closely allied to Industrial Art, and in their alliance so little modified, as to demand notice, before proceeding to a consideration of those industries, the types and constitution of which are affected comparatively remotely by the three Fine Arts. I class in the former of these categories engraving, lithography, chromo-lithography, and photography.

From the days of Marc'Antonio Raimondi, through those of Velpato and Raphael Morghen, to modern times rendered illustrious by the names of Perfetti, Jesi, and Toschi, the Italian school of line engraving has maintained an almost unquestioned pre-eminence over its contemporaries of the rest of Europe. That great work, the engraving of the Frescoes of Correggio at Parma, upon which all the later years of Toschi's life were employed, contributed to the education of a generation of engravers, many of whose works are fully worthy of their cultivated master.

The basis of all excellence in this art is, of course, the perfection of what is known as the engraver's drawing—in other words, his rendering in *chiaro-scuro* (of the exact size of the plate proposed to be produced) of the picture selected for reproduction on steel or copper. In this art the Italians have greatly excelled, and do so still, since it would be scarcely possible in this way to surpass such a drawing, for instance, as that by Calamatta of Raffaele's "Madonna di Foligno."

For perfection in soft and fleshy modelling, the palm

must, I think, unquestionably be given to Toschi, for his print of the Madonna della Scala, by Correggio; and Tommaso Aloysio Juvara, the leader of the Neapolitan school, several of whose minor specimens are of extraordinary excellence, must, I think, be placed next in order of merit.

Of Toschi's old assistants on the Parmesan Correggios, Perfetti of Florence, Scotto of Genoa, and Calamatta of Civita Vecchia, many agreeable specimens are exhibited; and the print of the Madonna della Seggiola, by the first-named, is worthy of high commendation.

A work now in progress on the gallery at Florence, and most creditable as a current Italian publication, appears to have given employment to many of the best cotemporary engravers, and beautiful plates as well as engravers' drawings for this work are exhibited by Ulisse Forni, Frederico Calendi, and Agostino Tricca.

I cannot leave the subject of Italian engraving without noticing the extraordinary pen-and-ink drawings by Professor Vincenzo Gazzotto of Padua. On three large sheets this artist has depicted, in a most masterly manner, the "Joys of Paradise," the "Sufferings of Purgatory," and the "Despair of Hell." Not only are these compositions highly imaginative—in this respect rivalling the analogous works of our own Martin—but they are drawn with a masterly knowledge of light and shade, foreshortening, and of the human figure. The drawing of Paradise is exceedingly beautiful.

In chalk and ink lithography, a fair average is maintained by the houses of Richter, of Naples; Carpentier, of Florence; and Borzino, of Milan; while in chromo-lithography they may safely be put in comparison in quality, if not in quantity of production, with the larger establishments of Paris, Vienna, Berlin, and London.

By the first-named house two works are exhibited, the execution of which is eminently honourable to Italy at the present time. One of these is a perfect series of illustrations of the painted decorations of Pompeii, published by Niccolini, being for the most part *fac-similes* of the beautiful drawings of Abbate. The other is an equally fine series of illustrations of the Abbey of Monreale, near Palermo. The latter work has been produced mainly through the energies of the Benedictine Fathers of the Abbey, under the able leadership of the Padre Gravina. For those who would seek to revive the manufacture of pietorial mosaics in this country—and happily they are now many—no more useful work can be recommended than this, in which the glories of the celebrated Norman Cathedral are admirably reproduced in all their details. Borzino's imitations of oil pictures are all but deceptive; while Carpentier produces, at very reasonable prices, excellent coloured *souvenirs* of the most beautiful pictures of Fra Angelico and other masters.

The illuminator's art is so nearly allied to the art of chromo-lithography, that I may consider this to be the fittest place to notice the evidence given by Napoleone Verga of Perugia, that the traditional skill of the Italians in "*quell'arte che alluminare é-chiamata a Parisi*," from the days of Dante to the end of the last century, has not been lost. In his illuminated addresses from the municipality to the Marchese Pepoli, Verga shows himself, if somewhat inferior to Giulio Clovio, Buonfratelli, and Girolamo dai Libri, superior to almost all other ancient magnates in the art of illumination on vellum.

As connected also with chromo-lithography, may be noticed the art of colour-printing by means of typography, that is, from type or brass rule. Of this some good specimens were shown by Frederico Lao.

Raffaello Salari, of Florence, contributed facsimiles, executed with the pen, of ancient block and other early printing and wood-cut illustrations, fully sufficient to deceive any eyes but those of the most accomplished bibliomaniacs, their perfection equalling, if not exceeding, that of our justly-celebrated Harris, whose works created so much sensation among the learned in rare editions and tall copies in 1851.

In photography the names of Ponte of Venice, Alinari of Florence, and Dovizielli of Rome, are well known in this country as connected with very perfect reproductions of the most striking architectural monuments of those cities. It may be enough to say that they ably sustain their reputation amidst rivals whose excellence brings them within a few paces of the foremost in the race. Duroni of Milan exhibits a full-length life-size figure of the king, in its way a triumph over very great difficulties. Caldesi's reproductions of the Hampton Court cartoons are too well known to need commendation from me.

My respected colleague, Mr. Le Neve Foster, will no doubt furnish you with such comments on the relative excellence, from a scientific point of view of these photographs, and from an economical point of view of the decorative arts, as may justify my noticing now only very briefly those refinements of design or execution which raise certain branches of production from the position of crudely supplying natural wants to that of ministering to that craving for beauty, which becomes more or less largely developed in each branch of manufacture in proportion to the fluctuating conditions of highly civilized nations.

In metallic art there was not much to notice, since none of the branches of that class of industry were very largely represented.

In the precious metals much more design and ingenuity were displayed than—with one or two exceptions, to be presently mentioned—appear in productions in the baser metals. I am unable to praise the silversmiths' work generally, since the Italians as yet do not appear to have fully appreciated the ancient styles of finish of their own forefathers, or even those of the Wagners, Froment-Meurices, Morels, and Vechtes, of the past and present generations in other countries. The best works of this kind, where little was really good, appeared to be the vase designed and executed by Tomaso Rinaldi of Modena, and the sword of honour presented to the King by the citizens of Modena, and executed by Rinzi of Milan. The steel blade of the latter, which was cleverly inlaid with gold and silver, showed that the old art of working *all'azzimina*, or damascening, in which Cellini so greatly excelled, is not lost in Italy.

A still nobler sword than this, as far as material is concerned, was exhibited, the work of Castellani of Rome. The hilt was somewhat too severe in style for one wrought in gold, and did not appear to me equal in workmanship to much that I have seen elsewhere, and indeed in London last season, by the same distinguished jeweller. It is to be regretted that he did not contribute any other specimen of his skill on the present occasion. I must confess that I have seen in shops at Rome, Genoa, Florence, and Naples, far better jewellery than was displayed in this the first great Italian Industrial Exhibition, where so important a branch of industry should have been better represented.

In cast-iron there was little worthy of remark, with the exception of a very clever gas lantern, cast at the foundry at Pignone, near Florence.

In bronze and brass founding and chasing, I have never seen in any country better work produced than that for which Clemente Papi, of Florence, is so justly renowned; and I believe that it has puzzled those most learned in the processes of metal casting to understand by what means his extraordinary reproductions of groups of natural flowers have been made out of molten metal.

In wrought-iron, for which I need scarcely remind you that Florence and Sienna were formerly most celebrated, Pasquale Franchi, and Benedetto Zaffari (both of the latter city), exhibit themselves as truly cunning smiths. The former has produced a small pair of gates, in which the vine, the olive, and groups of corn, become admirable ornaments to a well arranged series of conventional lines and forms; while the latter sends some iron rings and brackets, similar to those formerly attached to the old palaces of Italy. These are all wrought with hammers and punches, with such freedom and spirit as to be likely enough to deceive enthusiastic purchasers who may be

unable to refrain from attempting to carry off trophies of the former glories of those nobles, in whose families alone the right was hereditary to attach such marks of nobility to the head-quarters of their race.

In pierced steel work the cutlers of Campo Basso, the only place in Italy in which much cutlery is manufactured, exhibit considerable dexterity, and the pierced scissors of Vinditte Terzano are elegant, both in design and execution. One singular pair of desk scissors, highly and pleasingly ornamented, bore the remarkable inscription, in incised characters "Scipione Santangelo, al municipio di Firenze;" the gift recalling the good old days of Florence, when nothing was deemed too precious to be offered out of the tradesman's abundance to his well-loved home and city.

In glass, I am sorry to say, there was but little to praise, with the exception, perhaps, of the ruby glass of Piesaro, near Orvieto, the stained glass generally being inferior to contemporary productions in France, Germany, and England; while in cut and cast glass the form and ornaments were poor, and unworthy of notice. How much of the reproach of insignificance in this department might have been removed had the establishments of Murano freely contributed the results of their best exertions, it is difficult to say. Let us hope that whenever the next Exhibition of the products of United Italy may take place, the descendants of those who in the old time thought it no degradation to their nobility to be masters in the craft and mystery of glass making, may successfully vindicate their forefathers' reputation.

In Ceramics, however, there was much to interest. At the head of this branch of industry stood, without a rival, the Marquis Ginori, who now sustains, to his own credit no less than profit, the old factory at Doccia, founded in 1735 by one of his ancestors. In fine porcelain the productions of the establishment leave little to be desired as to the quality of the paste, but the painting is as yet unequal to the excellence of the material. The most remarkable and characteristic of Ginori's productions are the imitations of ancient Majolica, for his improvements in the manufacture of which the Marquis gracefully acknowledges himself indebted to the talents in chemistry of one of his protégés and assistants, Signor Giusto Giusti, whose death in 1858, while scarcely in the summer of his intellectual powers, may be a source of regret, not to the Marquis only, but to all Italy.

Many of these imitations of ancient Majolica, and more particularly of the Fontana and Zuccheri types of it, are so ably executed as to imperil inexperienced collectors, who are too apt to believe that it is possible to obtain by chance objects for ten pounds eagerly sought after by many really well informed in such matters, who would not hesitate to give ten times the sum for undoubted specimens of the works imitated. Let one and all discard such vain illusions, and beware of either too cheap or too dear "articles de vertu" in Italy.

I was happy to notice that some of the most graceful of the Doccia productions were purchased by Englishmen, and among others, one of the smallest but prettiest, by our friend Mr. Crace.

In one of the great difficulties of the potter's art, that of burning large groups in biscuit, and allowing them to cool without cracking, the Marquis Ginori has not proved altogether successful, yet the design and modelling of his principal specimen deserved a more successful treatment in firing.

Although he may be considered as without any serious rival in the production of porcelain, in some of the appliances of earthenware with enamelled glazes he meets with competitors of almost equal ability. Thus, in the revival of pavements similar to those which floor the celebrated loggie of the Vatican, made it is believed by Girolamo della Robbia, Bernardino Papi, of Sienna, proves himself a thoroughly capable manufacturer. As also in Ginori's revival of the Luca della Robbia ware, others of the Lombard potteries prove that he is not alone in his

knowledge of the processes by which such objects were anciently wrought.

In ordinary terra cotta, such as those suited for stoves, large garden flower pots, and architectural ornaments, Bacci of Florence, Carlo Vanni of Impruneta, near Florence, Filippo Martinez of Palermo, and Raffaello Piegai of Lucca, exhibit very excellent productions, thereby demonstrating how widely a knowledge of these processes of old repute in Italy is spread.

Nor is it alone in quality that the specimens forwarded by these manufacturers excel, since in price it would be difficult in any other country, I think, to match them. For example, a really graceful stove in terra cotta, burnt by Furlani, and such as, in this country, I believe, would not, probably, be procurable under £3, I had the pleasure of buying for 25 francs, or £1; a much more ambitious and larger stove, of the same kind, by Ginori, was priced 80 francs, or about £3 4s. It is much to be desired that the Committee of Fine Arts for the decoration of the Horticultural Society's grounds at Kensington may find English manufacturers equal to the production of vases and other features for the embellishment of gardens at similarly reasonable rates, since not a few proprietors of more modest gardens throughout the country are craving for such objects at prices a little less extravagant than those they cannot avoid paying now if they would introduce any similar ornaments amidst their shrubs and flowers.

In ordinary tiles of inlaid clays, suitable for mosaic, the Cavaliere Avila Altoviti, of the Val d'Arno, reigns supreme.

The class of silk fabrics will, no doubt, be so ably noticed by my friend, your Vice-President, Mr. Winkworth, that I need do no more with respect to them and other textile fabrics, than remark that, as far as my powers of observation extend, in none, with the exception of the embroiderers art, was there any great evidence of able design in connection with their production.

For embroidery the Italians have long been celebrated, and many specimens were displayed, better both in design and execution, than any of those French and Belgian examples which have been so largely manufactured during the last century, for the rites and ceremonies of the Romish Church. One of the most splendid specimens of such work, although destined for regal rather than ecclesiastical use, was to be observed in the hangings for the royal throne, embroidered in the public Female School at Florence; the design for which, being by no less clever an artist than Pietro Cheloni, was of a highly satisfactory description, and the work reflected credit, more particularly upon the widow Bassi, the teacher of the art of embroidery in that school, under whose special superintendence the whole has been executed.

In dealing with the subject of ornamental carving in wood, we have already taken cognizance of one of the most important elements essential to the production of beautiful furniture. There remain, however, two or three special processes, which have been classed by the Florentine Commissioners under the head of furniture, and which merit particular attention.

The most important of these is unquestionably mosaic in Pietre Dure, glass, &c.; and the second that form of mosaic which consists in the inlaying of different-coloured woods, and which we generally understand by the name of marquetry.

The former of these processes embraces two distinct varieties, the one suited for internal use only, and the other for both external and internal use.

In the first-named class the now royal, but formerly Grand Ducal manufactory, for the execution of what we know as Florentine mosaic, naturally occupied the most eminent position.

Having, in a report I was employed to write for the Board of Trade on a class in which the productions of the Grand Ducal Manufactory were included, in the year 1855, gone at some length into the subject, I need not

recapitulate the details I then collected concerning the history and character of that establishment. I may, however, state that the same technical perfection which I had then occasion to praise, and the same faults, as it appeared to me, of judgment in the general design of the principal objects which I then pointed out, may still be considered to characterise the productions forwarded to the Exhibition under notice.

Thus the principal object, upon which it is said that vast sums of money and very many years of labour have been lavished, the altar frontal for the Chapel of the Medici, in San Lorenzo, is, it appears to me, altogether a mistake. With extraordinary patience and skill, materials of the most precious kinds have been selected and fitted to one another with microscopical precision, in order to reproduce a picture of the "Supper at Emmaus;" and, after all, wonderfully, but not successfully. In other objects, such as a magnificent table top, in which flowers, fruit, and birds are introduced, in combination with conventional ornament, a very much happier result is obtained. The best understood, however, of any of the productions of the Royal Manufactory, appeared to me to be the fine wardrobe in walnut wood, inlaid with panels of pietre dure, limited in design to almost entirely conventional ornament.

Private manufacturers have during the last 20 years been creeping up in excellence, as the Grand Ducal school has been somewhat losing its old monopoly of excellence; and we now recognise specimens forwarded from private studios of almost equal merit to those wrought at the government establishment; thus, in point of pictorial mosaic, the centre and medallions of the great table executed by Bianchini, are more effective than the *tour de force* of the royal fabric, the "Supper at Emmaus," although perhaps not quite so perfect in execution. In the centre of this table is a picture of the adoption of Giotto by Cimabue, executed with extraordinary delicacy and dexterity. Among the highly commendable specimens of this class of mosaic are also the table tops executed by Francesco Betti, and the Brothers Lattici, of Florence.

For those whose pockets are unprepared for such drafts as the purchase of any of these splendid works would necessarily make upon them, similar objects, made in Scagliola, and producing an equally brilliant effect, may be obtained at greatly reduced prices. One slab, executed by Picchianti and Son, of Florence, none but the most experienced eye could detect as being an imitation instead of an original.

Of the various materials in which pietre dure slabs are inserted, none appear to me to blend with it more successfully than ebony, and this happy union could not be better exemplified than in the beautiful little casket executed by Barzanti of Florence, which, both in the excellence of the mosaic and the taste with which the object is made up, could scarcely be exceeded.

In addition to mosaics formed with natural stones and marbles, some specimens of an agreeable, though rather too brilliant effect, formed by the insertion of artificial aventurine, made in glass, into marble and metal work, were exhibited by Signori Bigaglia of Venice, and, being a novelty, appeared to be highly appreciated by the Italians.

The other branch of mosaic based upon ancient Roman and Byzantine processes, is an art which has been steadily kept up in Italy, partly through the maintenance of the great Papal manufactory at Rome, and partly through the necessity of constantly supplying workmen and materials suited for restoring the great monuments scattered throughout Italy and Sicily, embellished both within and without with this luxurious decoration. But it is only recently that an attempt has been made to organise such facilities of production as may enable private manufacturers to offer their works in this department of industry for public sale. There seems every reason to anticipate that this industry will assume large proportions, from the demand existing for such architectural accessories, not in Italy only, but in all the highly civilised countries of Europe. The best

specimens were those sent by Salviati and Vincenzo Redi, of Venice, one a representation of St. Nicholas, from St. Sophia, at Constantinople, evidencing a power to reproduce the ancient Byzantine processes, and the other a figure of Christ, from St. Marks, at Venice, exhibiting an equal mastery over the Græco-Italian processes employed in that cathedral. Another competitor for patronage in this department of industry was Antonio Gazetta, of Venice. In all of these works the difficulty of producing good flesh tints and properly vitrified gold ground mosaic, appeared to be successfully overcome.

Marquetry—(Mosaic in woods)—is an art of oriental origin, communicated to and almost entirely monopolised by the Italians for several centuries of the Middle Ages. In the North of Italy it is still highly popular, and both at Paris, in 1855, and the present Exhibition, numerous specimens were to be seen—not in all cases sufficiently quiet in colour, or well understood in application, but almost invariably well and boldly executed.

The absence of Gatti, of Rome, whose ivory and other inlay was so highly admired at Paris, is greatly to be regretted, as nothing in this Exhibition is equal to the small cabinet he there exhibited in 1855.

The best specimen of inlay, and probably one of the best of furniture in the whole Exhibition, is presented to us in the table for a grand saloon, made by Giuseppe Fontana, of Pisa. This piece of furniture is in the fine old Siennese style (that which shortly preceded the year 1500), and leaves little to be desired.

The remaining furniture in the Exhibition is of good average quality, requiring no particular remark, if we except the good lac-work, in imitation of Chinese, of Luigi Zampini of Florence.

Some buhl-work was sent from Genoa, by Jacinto Grosso. In a carved picture-frame, by Lorenzo Papi of Florence, I observed a particularly pleasing effect produced by placing walnut wood carved in open work over a gold ground. I need scarcely note how good and cheap, and how well gilt and burnished the ordinary carved picture-frames of Florence now are.

In carpets the Italians are altogether behindhand; but some of their silks and velvets for upholstery, particularly the latter, are by no means bad.

I did not notice any good lace in the Exhibition, but both at Venice and Genoa I have seen modern nearly equal to the old. Some of the fine thread needlework on cambric was exquisite.

In book production and decoration, although the glories of the classic printers of Italy—the Aldi, Giuntas, Gjolitos, and Bodonis—were not perhaps fully sustained, there were many evidences of excellent capability. In bookbinding, particularly, the houses of Vezzosi of Turin and Binda of Milan took very high places, both for excellence of work and taste in the application of ornamental design to the requirements of their special branch of industry.

We have already noticed the perfection attained by the Italians in engraving and chromo-lithography, arts now all but indispensable to the perfection of luxurious typography. It remains only to say a word or two in vindication of the national powers in the art of engraving on wood. I observed scarcely any specimens in the Exhibition, but in contemporary publications, and more particularly in the *Giornale dell'Esposizione Italiana*, I noticed many examples of fair average excellence.

Such are a few of the observations which occur to me in respect to the present of Italian industry, as exemplified by the products displayed in the Exhibition at Florence, and with your permission I will now proceed to add a few remarks touching the even more important question of the possible Italian Art-Industrial future, as now foreshadowed.

As there can be no fire without fuel, so there can be no fruitful production without education; and it is from the withdrawal of the restrictions which have hitherto tended to discourage every class of practical instruction, throughout most of the States into which Italy has been divided,

that the probably most prolific source of future benefit is to be anticipated. Thus, in the fine arts, although many costly literary works, such as the "History of Painting," by the late Professor Rossini, of Pisa; the "Illustrations of the Certosa of Pavia" by Durelli; of Milan by Cassina; of Venice by Cicognara; of Ancient Art by Canina; of the Museo Borbonico, by the Neapolitan Government; and of the Florentine and other academies, have been produced mainly in answer to a foreign demand, there is an almost entire blank in the contemporaneous supply of what may be understood as school books of art fit to place in the hands of workmen and students. Since the days of Mengs Algarotti and Visconti, but few Italian writers have followed closely those theories of esthetics which have largely engaged public attention in Germany, France, and England, and still fewer have endeavoured to methodise and popularise those texts for the practical instruction of the student.

Gioiberti's eloquent and learned Essays, "Del Buono," and "Del Bello," are far too ethereal to be palatable to the general reader; while the master mind of Nicolini, the early bent of which inclined strongly towards the solution of art questions, as evidenced in his excellent discourses on Oragna, Michael Angelo, Leon Battista Alberti, on "The Connection between Poetry and Painting," and on "The Influence of the arts on Social Life," became subsequently engrossed by political, literary, and educational questions, of even more serious import to Italy.

Among modern writers on the subject of the fine arts, the Count Selvatico, the Marchese Ricci, and the Marchese Roberto D'Azeglio, may be considered as having effected the largest amount of good; but there is still much to be hoped for, now that it is possible for the books published in one part of Italy to be read in others, besides those in which, having eluded the Seylla of state censure, they were imperilled and imprisoned by the Charybdis of heavy and almost impassable barriers of state dues and inquisitorial police.

To the workman, however, there are practical sources of instruction, even more valuable than the text books of his art. These are to be recognised in the works of his contemporaries. What can be imagined more instructive for an apprentice than to have placed under his eyes the best performances of his master contrasted with those of other manufacturers? What more beneficial than to be able to examine the productions of those who in any special branch of industry are superior even to the master he has been accustomed to recognise as to him its practical head? Such instruction is to be derived from Exhibitions such as that under notice; and it is to be hoped that the present may be but the first of a long series in which from year to year, and in different localities, the Italians may take stock of their own advancement, and from time to time enjoy opportunities of comparing their own productions with those of other, and perhaps in a commercial sense, more advanced, nations of Europe. The tendency and ultimate result of such comparisons and such stimulants will no doubt be in Italy, as their action has already frequently proved in other countries, to convert exceptional into staple productions; and to lead to the confirmation of a manufacturer, treading with hesitating steps the path of novelty, in branches of industry ultimately destined to confer riches and honour on the land in which they may be originated. There is, too, in these Exhibitions a species of combination and subordination of means to a common end, the moral effect of which, for the Italians especially, cannot but be most excellent; and may tend strongly to correct, by a system of aggregation, the tendency to isolation so largely developed among the working classes by antecedent social and political restrictions.

It is difficult for any traveller in Italy now, who may be at all acquainted with the great founts of Della Cruscan literature, not to recognise the deterioration which has befallen the noble Italian language; a deterioration commencing, perhaps, with the redundant epithets of Marini,

and continued through the inanities, of the "Compagnia famosissima della lesina," and of the still more celebrated Arcadian academy, to the present comparative decrepitude of once vigorous speech. Owing to a want of unrestrained communication, and of freedom of discussion, oral or written, on any but the most trivial subjects, there have been developed of late years tendencies—to cling to defective *patois*, by way of concealing convictions on the one hand; and to verbosity, as a means of disguising ignorance, on the other hand—which have nourished the weeds of both Italian thought and Italian language, to the choking up of the flowers which were wont to spring so spontaneously from that ancient hot-bed of civilisation. This will, no doubt, be speedily rectified by a free press, and that facility of intercommunication by means of railways, which will ultimately obliterate the provincialisms complained of.

The same general principles of repression that checked the development of thought, that enfeebled the language, and barred the practical usefulness of the middle classes in Italy, condemned, almost as conspiracy, any attempts in the lower classes to remedy, by combination, the evils incident to their being left, as it were, without those natural leaders in art and industry which the middle classes in free countries invariably supply to the artisan.

Another unquestionable source of probable benefit to the arts in Italy must be recognised in the development of principles approaching to those of free trade, as opposed to old obnoxious tariffs, and in the increase of commerce and the profits arising from trade and manufactures to be thereby induced; for we cannot forget that it was out of the fulness of business profits, rather than from any other source, that the funds were supplied in old times, which led to the creation of those noble monuments which gave to the Italy of the fifteenth century its pre-eminent position in the history of art and art industry.

While it is true that a high development of industrial art is not an inevitable attendant on the existence, in any state of a high degree of social and political liberty, in cases where the genius of the people is not bent in that direction; it is certain that where the tendency of a population is so strongly set as to have maintained, during ages of repression, and under circumstances of the most antagonistic description, such an amount of capability as is now manifested by the Italians, those germs—dormant, or nearly so, during periods such as those referred to—will fructify a hundredfold under institutions calculated to develop personal independence, and free action in that direction towards which the sympathies and aspirations of an enthusiastic people congenitally tend.

A comparison of the past with the present, and a correct appreciation of the phenomena of each, may certainly justify what has been predicted of the future of Italian art industry, but there exists yet another source from which as much fruit may be probably anticipated, as from any of the reliable concurring causes to which allusion has been made. Such a source is to be found in what is commonly called "the chapter of accidents." As perhaps the brightest, though most sadly tarnished, American genius, Edgar Poe, acutely remarks:—"The history of human knowledge has so uninterruptedly shown that to collateral, or incidental, or accidental events, we are indebted for the most numerous and most valuable discoveries, that it has at length become necessary, in any prospective views of improvement, to make not only large, but the largest allowances for inventions that shall arise by chance, and quite out of the range of ordinary expectation. It is no longer philosophical to base upon what has been a vision of what is to be. Accident is admitted as a portion of the substructure. We make chance a matter of absolute calculation." Without going so far as this writer, we may yet carry a large sum to the credit side of our account from what mathematicians have designated, "the doctrine of probabilities."

Thus, then, it is with a hope almost approaching to certain anticipation, and in serious thought rather than

glowing sympathy, that I venture to augur, from the combination of the excellence already attained, with the facilities for progress opened by its new political constitution, a future for the arts and industries of Italy, such as may place them on a level with, if not in advance of, the most successful worshippers at the shrine of beauty in any other country of Europe.

It remains for us now, in the last section of this essay, only to endeavour to derive practically the largest amount of benefit we can from the past experiences of the Italians, and from the lessons which their productions past and present may teach us in the present day.

The most important of these, it appears to me, is to recognise how, under all circumstances, the Italian demands art, not as a luxury, but as a necessity. If he cannot have it in good material he will have it in bad; but in some shape or other his eyes must be gratified with that without which vision would be to him but comparative blindness.

If, for instance, the view from one of his saloons is terminated by a blank wall, as is the fate of many of those who dwell in our London houses, rather than let that wall remain a blank he will employ an artist to make him a design of an architectural or pictorial character. That design, if his means permit him to execute in marble, no material will be too costly for him to employ; if he cannot have it in marble he will have it in stone; if he cannot afford it in stone it will be in stucco; if he cannot afford it in stucco he will have it painted; if he cannot afford to pay anybody to paint it he will endeavour to do it himself; if he cannot paint it himself, or afford to pay for its being done, he will cover it with creepers—but supply his craving he most assuredly will. If we could feel the same active want, it is unquestionable that our greater amount of vital energy and greater wealth would lead us even better to supply our cravings than the Italian is enabled to gratify his.

What then is most wanting in us is an ardent desire for the beautiful. I am far from saying that this desire does not exist in a large and rapidly increasing percentage of the English people, but with us it is so interjectional a sensation as to lead to comparatively little practical result. The rich man, who sees a picture or statue which pleases him, will buy one, or other, or both, but how seldom with the least consideration of special fitness for supplying any particular want—much thought of, long cherished, and carefully determined upon. The nature of such a want, and the best mode of supplying it, will occupy the earnest thoughts of the Italian, but with an Englishman, in a general way, the inclination will be but desultory, and if not supplied at a moment when strongly felt it will pass away, and perhaps never meet with realisation at all.

Another lesson of great importance to us may be derived from the fact that, both in the past and in the present the Italians have never been in the habit of looking at any one art as perfect in a condition of isolation from others. To produce for them the effect of beauty or nobleness all must contribute. Colour is just as essential as sculptural form, and both must be held in subordination by the symmetrical conditions of architectonic disposition of lines and spaces.

We, unfortunately, now see too many of the great monuments of Italian art stripped of half their furniture; but if, from the relics of perishable objects preserved in museums, such as that at South Kensington, we attempt to restore to those denuded monuments, to those ransacked palaces, "those banquet halls deserted," the embellishments we recognise as having formerly belonged to them, we shall at once see that the attainment of a really perfect effect in monuments, the beauty of which was dependent upon the combination of the Fine Arts, could only, in Italian eyes, be properly effected by super-adding with profusion all that the industry and ingenuity of the most skilful workman could produce in the Industrial Arts.

To this union of all the Fine Arts among themselves, with the Industrial Arts attending as their handmaids,

we must look as the most important element in all magnificence, and if we would emulate the Italians, we must not rest until we have learned to blend all cognate arts and industries in harmony.

The third great merit in the best Italian production, whether in a small article of industry, or in the most magnificent monument, is nobility of inclination.

The mistake, for instance, of building the front of a palace in stone and suddenly dropping off the instant the corner is turned into brick, might occur to even a millionaire in this economical age, but would scarcely have presented itself to a Medici, or a Farnese, in the old days of Italian magnificence. Not that the wealth, or the inclination to do what is handsome, might be less in the one case than in the other, but that public opinion and system would keep the patrons of old straight, and allow those of to-day to fall into what cannot but be regarded as an architectural meanness.

It would be, of course, too hard to point to any particular cases where hundreds are almost daily guilty of committing similar solecisms in taste, but unless we are to look for the exemplification of nobility of structure to those whose means place it within their power, how can we expect it from those to whom an increased expenditure might be a really important consideration.

Nobility of material lavishly used, ample space, solidity of structure, and the gift to the eye of something obviously designed rather to please than to pay,—together with the effect that such departures from rigid utilitarianism produce instinctively on the spectator,—sources of effect lavishly indulged in in Italy at every period of her history, are only beginning to be appreciated amongst us in the present day.

At the times when architects, such as Inigo Jones, Wren, Gibbs, and Chambers, endeavoured to maintain in this country the principles of grand Italian architecture, founded upon the universal practice during the best classical and mediæval periods, marble, oak, and stone, were freely used. Cortiles and loggias, colonnades and arcades, were not banished as profligate waste of ground and money. Carving, and the elaborate working out of ornamental features in true and just proportions, were considered to be essential to fine effects. Paintings were not to be hung as by accident against walls—here a Madonna, and there a set of boors drinking—but allotted places were provided for them, in the vaults and on the walls of the principal apartments. Sculpture, too, found its niches, and when English talent failed to supply it, the services of foreigners, in despite of strong insular prejudices, were freely enlisted. And it was precisely when the public taste adopted a meaner class of building materials, a grudging spirit in the distribution of space, and a lower kind of internal decoration, that the arts of design in this country, with some few honourable exceptions, fell to zero. From that pitch (if I may use the expression) of degradation and disintegration, they are now happily rising into a concrete and perfect form with a reaction, the vigour of which is scarcely to be paralleled in the world's history. We are beginning to do better in each separate department of production, we are beginning to recognise that excellence in one must necessarily be combined with excellence in others, and we are beginning, in fact, to learn and practice the very system still lingering in the hearts and habits of the Italians. May we advance with them, and they with us, for it is one of the happiest conditions of all true art, that if it be worthily carried to perfection, its universality must breed honourable emulation, but never envy or jealousy.

DISCUSSION.

Mr. JOHN BELL had not had the advantage of seeing the Florence Exhibition, but he regretted it less after having heard so interesting an account of it as was given in the paper just read. That paper was very excellent on a great many points, but there was one in which he was

particularly interested—viz., sculpture. There seemed to be no part of the Florence Exhibition to which Mr. Digby Wyatt had paid greater attention than that. It was natural, because that art was the growth of Italy. In fact, he thought it might be said that art grew where the materials to work upon existed. Greece had beautiful marble, and the art of sculpture grew there. Rome, also, had beautiful marble, and the art grew there. In this country we had to import the marble, and that might be one of the reasons why we had not made so much progress in the art of sculpture as the Italians had done. He hoped Mr. Digby Wyatt would be able to tell them that the pieces of sculpture of which he had made such admirable mention, would be likely to form part of the forthcoming exhibition in the present year. Mr. Digby Wyatt had mentioned the subject of emulation, no doubt it did great good, and he hoped those works of sculpture which had been referred to by Mr. Digby Wyatt would induce artists in this country to endeavour to surpass them. There was one piece of sculpture to which Mr. Digby Wyatt had made special allusion, that was the "Girl Reading." He had referred to it as being remarkable for its simplicity and close adherence to nature. He (Mr. Bell) hoped that would come to England; because there would be exhibited a work of art by one of our own artists, also a "Girl Reading"—to which he believed the expressions used by Mr. Digby Wyatt would fully apply. The piece of sculpture he (Mr. Bell) referred to was the "Girl Reading" by M^r. Dowell. Many present had, doubtless, seen it. It was one of the most beautiful works ever produced in this country. He had no doubt it would form part of the Exhibition of 1862, and he hoped to see the works so highly spoken of by Mr. Digby Wyatt there also. He was sure the remarks of Mr. Digby Wyatt, as to the benefits of emulation, would be fully appreciated by all present.

Mr. OWEN JONES (responding to the call of the chairman) said his friend Mr. Digby Wyatt had gone over such an extended subject that he was quite unprepared to follow him; but he would say it had given him great pleasure to hear the very liberal views which Mr. Digby Wyatt had endeavoured to inculcate, and which he was sure the meeting would approve. All those who, like himself had not been able to visit Florence, must have been much gratified at the very clear and artistic view which Mr. Digby Wyatt had given of the Art progress of the Italians of the present day, and of their possible future. He quite agreed with that gentleman, that the distinctive feature throughout Italy was that art instinct which pervaded every class of society, and Mr. Digby Wyatt had shown it was that in which, as a nation, we were most particularly deficient. He, however, hoped that at the present time there had arisen a much higher feeling for Art amongst the people, and he felt no doubt that the Exhibitions which had already taken place had done much to create it; and he felt confident that the forthcoming one would stir up men's minds to perfect the study of the beautiful. He begged to offer his sincere thanks to Mr. Digby Wyatt for his interesting paper.

Mr. THOMAS WINKWORTH merely rose to answer, to a certain extent, the inquiry of his friend Mr. Bell, as to the probability of the best specimens of sculpture in the late Florence Exhibition being sent to the Exhibition of 1862. He had the pleasure, when there, of forming the acquaintance of the gentleman who was principally employed in arranging that department of the Florence Exhibition, Signor Sebastiani Penzi, and he told him (Mr. Winkworth) that knowing as he did the various artists who had contributed to the collection, he could pretty confidently state that almost every piece of merit, (which must therefore include most of those to which Mr. Digby Wyatt had so ably and with such just appreciation of their artistic value referred) would find a position in the Exhibition of 1862. He joined with Mr. Owen Jones in the expression of his sincere obligations to Mr. Digby Wyatt for the way in which he had brought before them the present position

of the fine arts in Italy, where they might be considered as almost indigenous, and in that respect he believed he spoke the feelings of all present.

Mr. BISHOP wished to make a remark upon what had fallen from Mr. Bell. That gentleman had said that a particular art grew where the materials for it were found. He thought the artists of this country must not screen themselves for not being first-rate artists under the plea that the materials were not produced in this country. The remarks of Mr. Bell would equally apply to the material of iron, which was produced to a greater extent in this country than in any other in the world, and yet we were in no way celebrated for great artistic works in that metal. In Seville he had seen iron work in the form of gates, &c., which he had never seen equalled in this country. He had been asked, when in Florence, how he liked that city, and his reply was, that he had never been in any place where there was so much artistic design, even in simple things. In his turn he asked his interrogator, how he liked London? and the reply was, "Your art is all right angles; even your lamp-posts are right-angled triangles." That was the general impression abroad with regard to art in this country. He met with an Italian at Pisa, who told him that after having been five years in England as a designer of shawl patterns, he felt himself incompetent to his task, because he saw nothing around him to aid him in it. He thought much practical good would be effected by the exhibition of good photographs of the great works of art dwelt on in the paper, and a very great purpose would be answered if they were placed so that our artists and workmen could have the opportunity of inspecting them.

Mr. WINKWORTH said as an effort was being now made to give encouragement to the production of mosaics in this country, he begged to ask Mr. Digby Wyatt whether he had had any opportunity of ascertaining the relative expense of producing mosaics at the present time, as compared with ancient times; and also what he thought would be the expense in England as compared with Italy, ancient or modern.

Mr. DIGBY WYATT replied that he had made inquiries on this subject. It was almost impossible to ascertain what the cost of a particular piece of mosaic had been, because there were only three great establishments in Italy where it was made, and they were the only establishments that he was aware of at which mosaics for monumental purposes were made. These establishments were supported chiefly by permanent funds, so that it was difficult to ascertain what was the cost of any particular piece of work. From inquiries he had made, he found the cost varied very much. In Rome, where the work was very fine, he had heard that the cost was as much as £12 per foot. In Venice it was from £4 to £5 per foot. He thought it would be difficult to get the work done in England at less than £5 per foot. He had very little doubt, when the first difficulty was got over, the price would not vary more than from £3 to £5 per foot, and in a few years' time they might consider that would be about the price.

Mr. WM. HAWES said there were some observations, towards the latter end of the paper, which induced him to offer a remark with regard to the prices to be charged to the working classes for admission to the approaching Exhibition. Mr. Digby Wyatt had very truly said, that the great benefit to be derived by the working classes was from the opportunity that would be afforded them of inspecting the productions of others at home and abroad. The apprentice was apt to look up to his master as the workman to be followed, and it was only by that class looking at superior works that they could be induced to emulate them. It would be impossible to describe the benefits which the working classes would derive from this opportunity of comparison, in language more powerful than that which had been used by Mr. Digby Wyatt; but it would be impossible to do good in this way if the price of admission to the Exhibition of 1862 was to be maintained at what it was in 1851. The working classes never went by themselves to

such places, and if the charge for admission was so high as to preclude the working man from taking his wife and family with him he practically was excluded from the great educational advantages that would be derived from the inspection of the productions of rivals in their crafts in other countries. Mr. Digby Wyatt had noticed the growing love of true art in this country—especially amongst those who from their position and means were able to encourage it; but might they not fairly ask whether a great deal of the want of love of art which had hitherto characterised this country was not owing to the absence of proper teachers of art. Had their architects that love of art which characterised the whole of the paper they had just heard read? Had they advocated and practised that freedom of thought and design, that love of comparison with the works of foreign countries, without which no progress could be made. The luxury of art had not been known amongst them; and it was only when such men as Mr. Digby Wyatt compared the works of foreign countries with those of their own country, and told them in what respects they were superior to ours, that we should become as fond of art, and as ready to encourage it in England as they were in Italy.

The CHAIRMAN said, Mr. Digby Wyatt was a fortunate man, and this Society was fortunate in that gentleman having been selected by the Council to proceed to Florence and make a report upon the late Exhibition there. No man that he knew was better calculated for that work than Mr. Digby Wyatt, from his well-known researches into these subjects. He (the Chairman) had not had the advantage of attending at the Florence Exhibition, and could not, therefore, offer any remarks upon it from personal observation. Many people, after a course of London labours, and perhaps London irregularities, went for three months to the German waters to recruit themselves. It was his own habit to take a course of three months in Italy, as he always found by so doing his taste was purified, and it gave him fresh zest to admire works of art. This year he had been detained by duties at home. He entirely agreed with what Mr. Digby Wyatt had said with regard to the strong feeling for what we called art which had always prevailed in Italy. Mr. Digby Wyatt had spoken of the Industrial Arts as being the handmaids of the Fine Arts. He (the Chairman) was afraid that those parties had once appeared before a Sir Cresswell Cresswell and had been divorced in this country, inasmuch as for a long time past there had seemed to be a complete division between them. Even as late as a few years ago, Englishmen imagined it to be some reflection upon the national character if they united the beautiful with the substantial. Things English were generally things substantially ugly; they might be useful and durable, but beauty was the last element considered. The Italians, from the earliest period of their history, were imbued with the consideration that the elements of beauty were essential in all things which served the uses of daily life. Their simplest boxes, their keys, their handbills, their knives, weapons, and armour—everything which they were in the habit of using, was beautiful with them. Mr. Digby Wyatt had described how the old Italian writers had pointed out the different masters who were to be employed not only in the decorations of a palace or a church, but in some of the most subordinate details. He might have furnished several illustrations of the carrying out of such advice. Take, for instance, the Palace of Urbino, built by Frederick, Count of Montefeltro, afterwards Duke of Urbino. This prince of a small Italian province sent for artists of the highest standing in all Italy, not only painters and sculptors, but workmen in mosaic, in pottery, and in metals. Their names had been preserved. Melozzo da Forlì—of whose works but fragments remained, yet sufficient to prove that he was one of the greatest painters of his time—Pietro della Francesca, and others, were employed in the walls of the principal apartments, not in painting Madonnas and drunken boozers, as Mr. Digby Wyatt had

remarked, to be hung up promiscuously in drawing-rooms and dining-rooms, but in decorative painting, with a meaning and an object. For instance, in the library, Melozzo and others painted the poets, philosophers, historians, and orators of ancient times. As illustrating a strong difference of taste, he (the Chairman) might mention that when he saw the palace, four years ago, the Papal legate who inhabited it had sent for an upholsterer, and caused the walls to be papered, and the sculptured chimney pieces and doors to be removed, for the sake, as was alleged, of rendering the apartments more habitable. This repugnance to decoration was with us almost a national characteristic. After the capture of Delhi, during the Indian mutiny, the beautiful palaces of the Mogul Emperors were occupied by our troops. One of the rooms in which an officer had quartered himself, had walls of the most delicate alabaster, inlaid with mosaic work of agate and other precious stones. This was not apparently consistent with his comfort, or his notions of a suitable dwelling-room for an Englishman, and he had the walls whitewashed, but still the gems might be seen glittering through this unworthy covering. They found the greatest masters of Italy devoting their intellects to what might appear, to the modern artist, trivial and unworthy things. Raphael did not disdain to employ his genius in bringing to perfection that school of arabesques which was founded by Benozzo Gozzoli, Perugino, and Pinturicchio. He spoke under correction, but it would probably be admitted that the most perfect specimens of decorative art, combining what we call high art with the most minute detail of decoration, was the well-known Piccolomini library, in the Duomo of Siena. Here splendid historical frescos were united with the most exquisite arabesques in architectural ornamentation, majolica pavement and carved wood-work—forming one well-considered whole; it was the unity—the carrying out the one great idea throughout, which gave the charm to, and constituted the great beauty of, this magnificent chamber. What would have been the result, if, as probably would have been the case in England, whilst the walls were painted in frescos the ceiling had been simply whitewashed, the dado of common painted wood, and the flooring of deal boards? That was what would probably have been done in this country a few years ago, if not at this day. He believed the South Kensington Museum—as it was called—had done much in teaching us what Art really was as applied to the enjoyments and to the necessities of life, and in awakening an interest in this kind of art. Those who had brought that important collection to its present condition were deserving the highest credit. People looked upon South Kensington as a museum. He did not. They had the British Museum for the reception of works of art and of antiquity, of all times and classes, illustrative of the progress of civilisation, and consequently of the history of man; but Kensington should contain such objects alone as would furnish instruction to, and cultivate the taste of, not only the working-man, the manufacturer, and the artist, but also those who had the desire, as well as the means, in their own dwellings and by their example, of promoting the public taste. A monument was to be raised to the memory of that illustrious Prince whose loss the whole nation deplored, and none more than those who were connected, like the present audience, with societies for the encouragement of Arts and Sciences. His (the Chairman's) own feeling was that the Kensington Museum offered an opportunity of raising a worthy and suitable monument to Prince Albert, for it was mainly to him that the country owed that important national institution. He would like to see that museum converted from an incongruous collection of exhibition rooms, without architectural symmetry or design, into a really handsome public building, worthy of the metropolis and of the magnificent collection thus brought together, and dedicated to the memory of the late Prince Consort. He believed that such a building and institution would be not only a worthy but a lasting monument to his name. It must be acknowledged

that we were still very far behind in decorative art in this country. Mr. Owen Jones and Mr. Digby Wyatt had done much, by their important and valuable works, to improve it, but it was too much looked upon as coming within the tradesman's province. The works of these gentlemen were too frequently used like tailors' pattern books—a frieze applied now, and an ornamental border then, without any reference to object or site. That was not the way in which decorative art was understood and carried out in the last periods of Italian history, by the great artists of the time; and indeed, as Mr. Digby Wyatt had pointed out, we had still in Italy the strongest indexes of the artistic taste and of the love of the beautiful in the simplest details, which prevailed amongst all classes in that country, even in the present day. There was nothing which struck him more in Italy than the number of artists, or what we should call, perhaps, skilled mechanics, to be found in the small towns. He believed that was in a measure owing to the municipal system which once prevailed, and which was still far from extinct in many parts of Italy. Cordially as he rejoiced in the prospect that was opening for Italy of a great and prosperous national unity, he nevertheless hoped that the municipal spirit would never be destroyed, but would, on the contrary, be developed to the full extent. He believed it to be the best guardian of liberty and the best promoter of civilisation. During the middle ages each city rivalled its neighbour in the arts. Traces were still to be found of this rivalry in the artists, almost unknown, who long preserved the art traditions of their native places, and who, in any other country, would have established their fame. Thus, in the little town of Gubbio, he had found an ordinary workman imitating, so as almost to deceive any but the practised connoisseur, the beautiful majolica, with metallic lustre, of the celebrated Maestro Giorgio. At Siena, Giusti (whose work had been mentioned by Mr. D. Wyatt) was no unworthy representative of the great school of wood carvers of which the Barillis were the heads. He (the Chairman) had purchased the first tiles made by the young man at Siena, also mentioned by Mr. Wyatt, then a chemist's apprentice, who succeeded in imitating, almost to deception, the beautiful majolica pavement from the Piccolomini Palace, now in the Kensington Museum. Napoleone Verga, of Perugia, another young artist mentioned by Mr. Wyatt, and described as not an unworthy rival of the great Italian illuminator of the middle ages, had sent him (the Chairman) last year a collection of miniatures of singular beauty for sale, for which he had, he regretted to say, not been able to find a purchaser, even at the small price of four Napoleons apiece. One of the ablest workers in intarsiatura he had ever known (an art which once had attained the greatest perfection in Perugia) was killed in the capture of that city by the Papal troops; and Benvenuti, the wood carver, still sustained the reputation of the school of wood carving which once flourished in Perugia. He need not mention to them the name of Castellani, the celebrated jeweller of Rome, who was perhaps better known to English travellers than any other Italian artist-workman. However deficient may have been the collection he exhibited at Florence, he (the Chairman) could state that he had promised to send a complete series of his truly exquisite jewellery to the great Exhibition. He would prove himself to be a not unworthy imitator of Benvenuto Cellini. Mr. Digby Wyatt had alluded to the circumstance of architecture not having kept pace with the other arts in Italy, but the fact was that, owing chiefly to political reasons, there had never been a demand for architectural display. The Jesuits destroyed that art in a great measure. There were few churches built by them, and they were the great church builders of Italy of the last three centuries, which were not of the most debased style. It was almost incredible, that a people with the taste and feeling for beauty of the Italians, should have permitted their churches to be disfigured with the tawdry decorations and the hideous figures of

wood and wax which marked a feast day. He would not inquire the reason why this was so—it might raise questions to be avoided in such a meeting. Those who had seen the restoration of St. Maria Novella at Florence, of the Minerva at Rome, and of S. Petronio at Bologna, would form some idea of the degraded state of church architecture in Italy. He must, however, note one remarkable exception, the façade of the church of Santa Croce, at Florence, mentioned by Mr. Wyatt. He alluded to it more particularly, not only because it was a work of singular beauty, but because he thought Mr. Digby Wyatt was in some respects mistaken as to the way in which the work had been carried out. The architect, Cavaliere Nicolo Matas, had endeavoured to rebuild the façade in conformity with what was believed to be the design of the original architect, who had left it unfinished, and to connect it with the sides of the edifice which had been completed. Signor Matas had employed for the purpose only white, green, and dark red marbles, the three used in the finished part of the building. He had succeeded, in his (the Chairman's) judgment, in producing an admirable imitation of the old style; but the way in which the work had been performed was highly interesting, and appeared to him (the Chairman) to be the right way in carrying out a really great enterprise of the kind. Mr. Digby Wyatt had told them that the greatest artists in Florence had been employed.

MR. DIGBY WYATT.—For the sculpture.

The CHAIRMAN believed his friend had been misinformed. In a conversation with the Cavaliere Matas, he learnt that, so far from employing well-known artists, he afforded the opportunity for any young men to carve the sculptured heads and ornaments which adorned the doorways, &c. Those who then undertook the work did so partly from religious and partly from patriotic motives, and it was on the understanding that they were to be paid only sufficient pay for the actual labour, to maintain them; and that they were not to be paid for what might be termed the artistic skill they might display. These sculptures had thus been produced by young artists at the mere price of their day's labour, and a school of architectural sculptors was thus being formed. That the work could not have been executed, to any great extent, by first-rate artists was, he thought, proved by the fact that, up to last year, the whole sum expended did not exceed £10,000, of which nearly £8,000 had, he (the Chairman) believed, been contributed most magnificently by his friend and countryman, Mr. Sloane. He (the Chairman) believed there was a great career open for Italy. He trusted the Italians might go back, as regarded the decorative and other arts, to the position in which they were in the 15th century, before the bright, clear stream of Italian civilisation had been polluted by the barbarian torrents which poured down the slopes of the Alps, and by the false taste which followed, to hollow imitations of the classic schools. It was impossible to say to what perfection such men as Giotto Orcagna, their contemporaries of the 14th century, and the great masters of the 15th century, might have carried architecture, if they had been allowed to perfect the styles which they introduced. Mr. Digby Wyatt had alluded to the language of Italy, and had justly condemned its present weakness and effeminacy. There could be no doubt that a strong, nervous, as well as polished language afforded evidence of the condition of a people as regarded their liberty and civilisation. He thought that already a great improvement had taken place in the language of Italy, which augured well for the future. If Mr. Digby Wyatt was acquainted with the masterly state papers of the late Count Cavour and Baron Ricasoli, he thought he would be ready to admit that they were marked by truth, felicity of expression, and by an admirable logical and business-like beauty and clearness. The style of those statesmen was plain, straightforward, nervous, reminding them of that of the early Italian writers, the Villani and Macchiavelli. He was aware that it was con-

demned by the Italian school of classicists, who still affected the effeminate and exaggerated style of the Arcadians and the Academics. But that was perhaps the best tribute to its excellence. He believed that when statesmen had been trained to the habit of public speaking, by free debates, in a free popular assembly, as they would ere long be—the Italian language—a language of the highest capabilities—would not be unworthy of a great, free, and highly civilised people. He thought that already the state papers of modern Italian statesmen would bear favourable comparison with those of any other country in Europe. He would not detain them longer, but would now express, what he was sure was the general feeling of the meeting, when he tendered their best thanks to Mr. Digby Wyatt for the very interesting and instructive paper he had read that evening.

MR. DIGBY WYATT, in acknowledging the compliment, said he had not gone into the details of the work of the restoration of the façade of the Church of Santa Croce; but he might state that he had frequent conversations with the Cavaliere Matas, and inspected the building with minuteness. The hon. chairman was correct in saying that a great deal of the work was done by young men and boys, educated as his friend Mr. Owen Jones educated persons to carve the Egyptian intaglios at the Crystal Palace. But in addition to those decorative works there were large pieces of sculpture over the doors—bas-reliefs, 10 feet by 12 feet, which had been entrusted to the first sculptors of Florence. The great figures which stood upon brackets had also been given to the best artists of that city, as was the case with the great figure, nine feet high, at the top, so that whilst he repeated that the best talent had been employed upon the most difficult portions of the work, he did not mean to say there had not been great efforts made to encourage a minor class of art talent in the less elaborate portions. He thanked the meeting for the reception they had given to his paper.

The Secretary announced that on Wednesday evening next, the 29th inst., a Paper by Mr. George R. Burnell, C.E., F.G.S., F.S.A., "On some Recently-executed Deep Wells and Borings," would be read.

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(Continued from page 119.)

TRADE AND MANUFACTURES OF MOSCOW.—Moscow, containing about 373,800 inhabitants, and about 10,000 houses, which are valued at 200 millions of roubles, is at the same time the manufacturing centre, the principal emporium of the interior trade of the empire, and an entrepôt of all the foreign articles imported into Russia for the use of her manufacturing establishments. The principal articles manufactured in and about Moscow are woollen, silk, and cotton goods. As early as the year 1845 the manufacture of woollen stuffs of different descriptions occupied, in the Government of Moscow, 132 establishments, with 6,445 looms, and 22,916 working hands, the produce of whose labour was valued at 9,964,400 roubles; since that period they are computed to have increased by about 20 per cent., which would make for the present time a produce of about 13 millions, or one-half of the total produce of woollen manufacture in the empire. Of the different descriptions of woollen goods produced, cloth is decidedly the most important in point of quantity, although it may have somewhat fallen off of late, in consequence of the stagnation in the trade with China; but another branch that has been rapidly increasing during the last ten years is the manufacture of worsted stuffs, the yarn for which is imported partly from Germany and France, but principally from England. The development of this branch of manu-

facture is best shown by the quantities of yarn imported, which, in the years 1830 to 1850 have been increasing in the proportion of one to 15. Within a few years only mills have been established in St. Petersburg and Moscow for the spinning of worsted yarn; but only for the finer description, which successfully compete with the yarns imported from France and Germany, while the coarser yarns, forming the greater part of the consumption, can be procured only by importing them from England.

Silks.—This branch of manufacture, which is centred almost entirely in the Government of Moscow, is also very important, the quantity of raw silk employed being about 35,000 poods a year, chiefly Caucasian, but partly Italian and French. Trials have been made of late to employ East India and Chinese silks, imported from England, the result of which, however, has not been encouraging, and it will, no doubt, require some time to introduce these silks into the Russian factories. The number of workmen employed in this branch is about 16,000.

Cotton Goods.—This branch of manufacture which, under a system of protective duties, amounting to a prohibition, has been developing in Russia with astonishing rapidity, is to be met with principally in the Governments of Moscow and Wladimir. The numbers principally spun, and forming the greater part of the consumption, are 30 to 40 mule-twist, 20 to 30 water, and an intermediary description called medio. The numbers 30 to 48 are fully as good as the English, the importation of which in these numbers therefore had ceased almost entirely, until last winter, when considerable orders were again sent out to England, in consequence of a scarcity of the article, caused by the war. As to the higher numbers, the consumption of which is inconsiderable, it is impossible for Russian spinners to compete with the English. The weaving of cotton stuffs is done partly in factories established for this purpose, but principally in the houses of the country people, to whom the yarn is furnished by the printers. The texture of the Russian calicoes, therefore, is frequently uneven, and the size of the pieces irregular; therefore in the Asiatic markets, where they are to compete with the English calicoes, the latter are generally preferred. The printing establishments in this country have attained a degree of perfection equal to that of the English and French. The calico factories of the Government of Wladimir, producing a quantity about equal to that of the Moscow factories, are intimately connected with the trade of this city, which is the principal market, both for the purchase of the materials employed by them, and for the sale of their produce. The machinery employed in these and other branches of manufacture is imported from England, France, Belgium, and Germany. The inland trade of Moscow may be said to embrace, although in various degrees, all the products of the soil and manufactures of the empire. Among the fairs, which are of first-rate importance in the trade of this country, that of Nishni-Novgorod, beginning on the 25th July (6 August), holds the first rank, being the principal medium of interchange between European and Asiatic Russia. The amount of business transacted at this fair is from 50 to 60 millions, and among the articles of which it is the emporium, tea, furs, and metals, deserve to be particularly mentioned. The foreign trade of Moscow, to which the port of St. Petersburg serves as a medium, chiefly consists of the importation of the raw materials employed in the factories, such as cotton wool, cotton and worsted yarns, silk, oil, indigo, cochineal, dyewoods, and other articles of this description. The only export article of importance is sheep's wool, of which Moscow, owing to the great number of factories, is the principal entrepôt, although at the fairs of Kharkoff and Poltava, which take place in the months of May and July, large quantities of wool are bought, both for home consumption and for exportation. The absence of statistical data, deserving of credit, renders it impossible to give an exact idea of the importance of the Moscow trade, to show which, we will only add that the number of merchants entered in the three guilds of

Moscow is about 5,900, and the amount of capital declared them, as being engaged in trade, about 70 millions of by roubles.

Home Correspondence.

STEAM TELEGRAPHIC AND FOG SIGNALS.

SIR,—Mr. Delabere Barker's steam apparatus for blowing telegraphic and other signals, as shown by his illustration, p. 116, is extremely faulty, and will not produce the intended effect of generating superheated steam, because fire will not penetrate into tubes blank at one end. Neither the main fire tube in the boiler, nor the four smaller ones in the steam chest, have any exit at the upper end, and they are therefore worse than useless.

I enclose two sections of a vertical tubular boiler (60 tubes) constructed on the best principles, which will answer Mr. Barker's purpose exactly, and is drawn the same size as his illustration, but not to scale, as there is none to his diagram.

I have omitted all the usual appliances to steam boilers, which may be arranged at pleasure, but I should recommend a strong donkey-engine to be connected with his boiler, as it will be ultimately found more convenient and economical to cause the signals, of whatever kind, to be sounded by means of compressed air, which is much more manageable than high-pressure steam, and the very inconvenient drip from all steam whistles will be entirely avoided.

The condensation of atmospheric air is now rendered very rapid and economical by the use of three air pumps of calculated diameters, all driven at the same time by one three-throw crank shaft.

I am, &c.,

HENRY W. REVELEY.

To Correspondents.

ERRATA.—In the last number of the *Journal*, page 134, first column, line 30, for "corn" read "cotton," and line 60, for "Sakover" read "Oakover."

MEETINGS FOR THE ENSUING WEEK.

- MON.....Roy. Geographical, 8½.
Entomological, 8. (Anniversary Meeting.)
Actuaries, 7.
Medical, 8½. Clinical Discussion. Mr. Ernest Hart, "On a case of Aneurism of the Orbit."
TUES....Medical and Chirurgical, 8½.
Civil Engineers, 8. Continued Discussion upon Mr. Bailey Denton's Paper, "On the Discharge from Under-drainage, &c.;" and, if time permits the following Paper will be read, by Mr. J. Da Samuda, "On the Form and Materials for Iron-plated Ships, and the points requiring attention in their construction."
Zoological, 9.
Royal Inst., 3. Mr. John Marshall, "On the Physiology of the Senses."
WED....Society of Arts, 8. Mr. G. R. Burnell, C.E., "On some recently-executed Deep Wells and Borings."
THURS...Royal, 8½.
Antiquaries, 8½.
Royal Soc. Club, 6.
Royal Inst., 3. Professor Tyndall, "On Heat."
FRI.....Royal Inst., 8. Mr. William Hopkins, "On the Theories of the Motions of Glaciers."
SAT.....Royal Inst., 3. Rev. A. J. D'Orsey, "On the English Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, January 17th, 1862.]

Dated 3rd October, 1861.

2473. W. Malam, Skinner-street—Imp. in apparatus for the manufacture of gas.

Dated 14th November, 1861.

2873. W. Leopard, Hurstpierpoint, Sussex—Imp. in railway break apparatus.

Dated 27th November, 1861.

2986. H. Brambach, 11, Lungengasse, Cologne—A new mode of manufacturing gas for illuminating purposes.

Dated 29th November, 1861.

3016. R. Cook and G. H. Spencer, Hathersage, Derbyshire—Imp. in the manufacture of umbrellas and parasols.

Dated 30th November, 1861.

3019. J. Cooper, Ipswich, and C. Garrood, Penge, Surrey—Imp. in cultivators, horse hoes, and horse rakes.

Dated 5th December, 1861.

3055. M. Henry, 84, Fleet-street—Imp. in printing and ornamenting textile fabrics, paperhangings, and other materials, and in surfaces and apparatus for such purposes. (A com.)

Dated 10th December, 1861.

3096. T. Higgins, Bow—Improved machinery for filling dipping clamps with tapers, match stems, and splints.

Dated 11th December, 1861.

3103. W. Clark, 53, Chancery-lane—Imp. in stoppering bottles and other vessels. (A com.)

Dated 14th December, 1861.

3144. F. Kohn, 17, Southampton-terrace, Waterloo-bridge—An improved mode of copying writings, drawings, prints, and similar objects.

Dated 16th December, 1861.

3152. G. P. Vallas, 2, Kentish Town-road, Camden-town—Imp. upon or additions to certain description of portable baths, with the object of rendering them available for use as trunks or boxes.

Dated 17th December, 1861.

3160. J. W. Chalfont, 7, Denmark-grove, Islington, and D. Keys, 15, Craven-street, Strand—Imp. in the method of, and apparatus for, winding up fusee watches and pocket chronometers, and setting the hands without key.

Dated 19th December, 1861.

3184. J. H. G. Wells, 2, Sandhurst-villas, Binfield-road, Stockwell—Imp. in the method of, and apparatus for, pumping elastic fluids.

Dated 20th December, 1861.

3188. J. Smith, jun., and J. B. Higgs, Coven, Staffordshire—Imp. in thrashing machines and in mills for grinding, and in apparatus for raising or moving grain in granaries and other places.
3202. G. T. Bousfield, Loughborough-park, Brixton—Imp. in machinery for attaching the soles of boots and shoes to the upper leathers. (A com.)

Dated 21st December, 1861.

3206. W. Bennetts, Tuckingmill, Camborne, Cornwall—Imp. in the mechanism required for and in the manufacture and composition of gunpowder.

3208. W. M. Williams, Handsworth, Staffordshire—An imp. or imps. in treating coal and other bituminous minerals and peat, in order to obtain solid and liquid hydro-carbons therefrom, and in apparatus to be used for that purpose.

Dated 24th December, 1861.

3222. T. E. Vickers, Sheffield—Imp. in the wheels of railway engines and carriages, and in the machinery or apparatus to be used in making the same.

Dated 26th December, 1861.

3236. H. Dawes, Sale Green, Sale Moor, near Manchester—Imp. in the method of treating steel for the manufacture of crinoline.

Dated 27th December, 1861.

3243. T. W. Atlee, Birmingham—Certain imp. in cocks or taps for drawing off fluids.

3246. R. A. Brooman, 166, Fleet-street—Imp. in steam generators, and in fire-bars employed therein. (A com.)

Dated 28th December, 1861.

3250. A. Warner, Threadneedle-street—Imp. in the manufacture of cases or receptacles for oil fuses and other articles used in the military and naval services.

Dated 31st December, 1861.

3260. W. Tongue, Chrissell-road, Brixton—Imp. in the manufacture of certain descriptions of woven looped and bobbin net fabrics by the application of certain fibrous materials thereto.

3262. W. Tongue, Chrissell-road, Brixton—Imp. in the manufacture of umbrellas and parasols.

3265. T. Pickford, Fenchurch-street—Imp. in the manufacture of manure.

3268. J. Haslam, Preston—Improved apparatus for winding, holding, and letting go cords, bands, or chains, particularly applicable to window blinds.

3270. W. E. Newton, 66, Chancery-lane—Improved apparatus for obtaining motive power from explosive compounds. (A com.)

Dated 1st January, 1862.

1. J. M. Rowan, Glasgow—Imp. in the manufacture of railway wheels and in apparatus to be used therein.

3. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in hose pipe joints or couplings. (A com.)

5. J. Walker, 25, City-road—Imp. in the construction of forts and fortifications which are applicable to floating batteries.

6. T. C. Clarke, Liverpool—Imp. in the construction of apparatus for heating and circulating water and other liquids.

7. J. Bradbury, Pendleton, near Manchester—Imp. in self-acting mules.

9. R. A. Brooman, 166, Fleet-street—Imp. in supporting and propelling vessels. (A com.)

10. W. Bush, Tower-hill—Imp. in omnibuses and other carriages.

13. W. B. Patrick, Highgate—Imp. in the manufacture of sugar, and in the apparatus employed therein.

14. E. F. Davis, Tavistock-house, Tavistock-square—Imp. in gas burners.

PATENTS SEALED.

[From Gazette, January 17th, 1862.]

January 17th.

1821. W. Savory and P. H. Savory.
1823. R. A. Brooman.
1829. W. Price.
1830. R. Thatcher.
1832. J. Platt and J. Buckley.
1836. C. N. Kottula.
1841. J. Beattie.
1843. G. F. Griffin.
1862. H. Cook.

1937. F. Richmond, H. Chandler, and W. B. Ritchie.
2618. F. J. Evans.
2662. J. C. Heaton and J. Dean.
2664. J. Chesterman.
2756. J. Wright.
2826. W. Tongue.
2842. W. Tongue.
2843. J. H. Johnson.

[From Gazette, January 21st, 1862.]

January 21st.

1844. T. Gray.
1845. N. E. Dumesnil.
1851. T. Hughes.
1859. R. Threlfall.
1863. W. Longmaid.
1865. B. Brown and R. Hacking.
1869. E. Haeftely.
1880. R. E. Garrood.
1881. J. B. Herbert.
1882. W. H. Harfield.
1899. T. S. Cressey.

1907. J. Rylands, T. G. Rylands, and P. Rylands.
1916. M. Pratt.
1956. W. Clark.
1964. M. A. F. Mennons.
2116. W. Clissold.
2243. R. O. White.
2314. B. Samuelson.
2535. J. Downs.
2840. W. E. Newton.
3046. C. S. H. Hartog.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, January 17th, 1862.]

January 13th.

124. W. Craft and T. Wilson.
January 14th.
129. W. H. E. McKnight.
130. P. A. Viette.
133. W. Betts.

227. J. White.
January 15th.
139. P. A. de S. S. Sicard.
147. W. Newman.
190. C. O'Hara.
224. R. Bodmer.

[From Gazette, January 21st, 1862.]

January 16th.

137. J. Montgomery.
143. R. G. Salter.
January 17th.
155. R. Bradley and W. Craven.
156. W. Trotter.

163. J. Whitehead.
166. J. Poupard.
January 18th.
160. P. A. Sparre.
170. J. C. Reid and W. Milner.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, January 17th, 1862.]

January 13th.

106. G. Riley. | 231. H. D. Pochin.

[From Gazette, January 21st, 1862.]

January 17th.

129. C. J. Dumery.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4431	January 10.	Improved Insulator...	William Thomas Henley	45, St. John-street-road.
4432	" 16.	Road or Street Kerbing and Channelling ...	John White Furday	Wedgebury.
4433	" 17.	{ Fastening a Connection of the Rails of } { Metallic Bedsteads and other articles }	Key Hoskins & Co.	Birmingham.
4434	" "	A Clothes Horse ...	{ Christopher Alsop and } { George Mequire }	70, Albany-road, Camberwell, S.
4435	" 18.	The new Imperial Train Skirt Improver...	James Jerram Pratt	{ Sherbourne-house, Rotherfield-street } Islington.
4436	" 22.	A Butt for the Game of Lawn Butts ...	Duncan Stewart	6, Stone-buildings, Lincoln's-inn, W.C.

Journal of the Society of Arts.

FRIDAY, JANUARY 31, 1862.

MEMORIAL TO HIS LATE ROYAL HIGHNESS THE PRINCE CONSORT.

The Council hereby convene a General Meeting of the Members of this Society, to be held on Friday, the 7th of February, 1862, at 4 o'clock p.m., for the purpose of receiving a Report from the Council on the vote of One Thousand Guineas to the Fund now being raised for a National Memorial to his late Royal Highness the Prince Consort, President of this Society.

By order of the Council,
P. LE NEVE FOSTER, Secretary.
Jan. 30th, 1862.

COMMUNICATION BETWEEN THE DISTRICTS NORTH AND SOUTH OF HYDE-PARK.

The Council, bearing in mind the important influence which such a communication could not fail to have upon the success of the Exhibition of 1862, have appointed a committee to promote this object.

This committee is now engaged in considering various proposals which have been laid before them, and will shortly make their report.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £444,700, have been attached to the Deed.

Guarantors holding ivory tickets for visiting the building are informed that those tickets are not available for any Saturday after the 1st of February.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

It is satisfactory to be able to record a termination of the difficulty of colouring the inside of the building. After experiments submitted by Mr. Hudson, Mr. Kelk, Capt. Fowke, and Mr.

Crace, it has been finally decided that the matter shall be placed in the hands of the last-named gentleman. He proposes to colour the pillars of the nave alternately a dark olive and red chocolate, with gilded capitals, and a line of gold round the base. The rib will have a narrow edging of light grey, and behind that panels alternately of scarlet and blue, picked out with gold; while the roof is a warm grey, with a foliage ornament in gold. The panels are so arranged that if in one rib the order of the panels is scarlet, blue, scarlet, in the next it is blue, scarlet, blue; thus preventing a long line of one colour running all down the nave. The great advantage obtained by this treatment is the lightness given to the roof. The rib, being of wood, looked heavy enough to crush the iron column on which it rested, but by means of the light edge outside the richer colours, this heavy look is completely dissipated. It may, perhaps, be objected that the treatment is not constructive; the details of the fitting of the rib are not distinguished by colour, while a series of false panels is created.

The domes are being pushed forward as rapidly as possible, and the western, although delayed by want of material, is now close on the heels of the eastern. The terminals are in course of construction below, and will be hoisted bodily to the summits of the domes. They will consist of a gilt ball and spike, the ball being seven feet in diameter. The walls of the picture galleries are being papered, and will very shortly be ready for the reception of pictures.

In the western annexe foundations are being laid on which heavy machinery will rest. The eastern annexe is advancing rapidly. In this latter will be exhibited minerals, chemicals, food, animal and vegetable products, and agricultural machinery; a space is also reserved at the end for a Third Class Refreshment Court.

SWITZERLAND.

The following gentlemen have been appointed to represent the interests of the Exhibitors from Switzerland:—

Mr. John Rapp, of Bâle, agent and Consul-General for the Confederation, *President*; Albert Streckersen, *Vice-President*; Mr. J. C. Imthurn, of Schaffhouse; Mr. Paul Brûe, of Geneva; Mr. G. Prevost, of Geneva; Mr. L. R. Bodmer, of Zurich; Mr. John Spitzle, of St. Gall; and Mr. Philippe Walther, of Vevey. Commissioners:—(Industrial Department) Mr. Gustave Vogt, Berne; (Fine Arts) Mr. François Buchser, Manchester.

BRAZIL.

The following gentlemen have been appointed Commissioners for Brazil:—The Commandeur Francisco Ignacio de Carvalho Moriera, Brazilian Minister, *President*; the Baron de Mana, and the Commandeur Joao Manoel Pereira da Silva.

Agent in London—Wm. Henry Clark, Esq., No. 6, Leinster-terrace, Hyde-park, W.

SEVENTH ORDINARY MEETING.

WEDNESDAY, JAN. 29TH, 1862.

The Seventh Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 29th inst., John Hawkshaw, Esq., F.R.S., in the chair.

The following candidates were proposed for election as members of the Society:—

Bridson, T. Ridgway....	Bridge-house, Bolton.
Challon, Charles	3, Berners-st., Oxford-st., W.
Clark, George	Albion-chambers, Bristol.
Dunning, Joseph	Langley, near Haydon-bridge, Northumberland.
Francis, David	24, Mile-end-road, E.
Foxwell, Thomas S.....	Shepton Mallet.
Howes, John	45, Hamilton-ter., St. John's-wood, N.W.
Smith, Henry	Bankfield, near Ulverston.
Thomson, John Robert...	19, Cadogan-place, Lowndes-square, S.W.
Wyon, Joseph Shepherd.	287, Regent-street, W., and 3, Langham-chambers, W

The following candidates were balloted for and duly elected members of the Society:—

Atkins, George James ...	25, Ovington-square, Brompton, S.W.
Barelay, Robert	29, Bucklersbury, E.C.
Beacock, Robert	Beeston-hill, Leeds.
Bingham, Henry C.	Wartnaby Hall, near Melton Mowbray, Leicestershire.
Binnie, Alex. Richardson.	7, Upper Lansdowne-terrace, Notting-hill, W.
Brooke, Edward.....	Norton Lodge, Timperley, Cheshire.
Brown, George	25, Newman-st., Oxford-st., W.
Chappell, James.....	388, Strand, W.C.
Cranston, James.....	Birmingham.
Dalley, John Lambert ...	Woodbury, Addiscombe.
Dawson, Christopher	Weston Hall, near Otley, Yorkshire.
Holdsworth.....	Reform Club, S.W., and 9, Lonsdale - terrace, Barnes, S.W.
Draper, John	13, Pall-mall, S.W.
Fearon, Frederick	Hill Top, Midhurst.
Fisher, Richard	Bradford, Yorkshire.
Gath, John William.....	9, Friday-street, E.C.
Heintzmann, Alexis	50, Greek-street, Soho, W.
Huguenin, Gustave	Maple-villa, West Dulwich, land.....
Jackson, Frederick Row-	S.
land.....	Beech-hill, Armagh, Ireland.
Kirk, John.....	The Park, Nottingham.
Leavers, J. W.	3, Leadenhall-street, E.C.
Madden, James	3, Bernard-street, Prinrose-hill, N.W.
Masey, Thomas Adair ...	Copthewick, near Ripon.
Mason, Rev. George	Kingsland Basin, N.E.
Mason, Wm. Henry	22, Kensington-pk.-gdns., W.
Moss, Arthur	Green Mount-terrace, Leeds.
Nichols, William	24, Mecklenburgh-sq., W.C.
Ogilvie, Robert Annesley.	Bedford.
Piggot, Joseph A.	314, Oxford-street, W.
Purdie, Thomas.....	St. Peter's-square, Manchester.
Ransome, Joseph Atkinson	71, Old Broad-street, E.C.
Remington, Reginald	Osborne Lodge, Tulse-hill, S., and 45, Upper Thames-street, E.C.
(Messrs. Crawford & Co.)	26, Clifton-gardens, Maidavale, W.
Sandell, Richard Barker...	
Schröder, Anthony.....	

Squire, Francis	Downend Lodge, Lostwithiel, Cornwall.
Turner, John Pemberton.	Snow-hill, Birmingham.
Walker, Henry	47, Gresham-street, E.C.
Weston, John D.	West-park, Bristol.
Wilson, James	Ravensbourne - park, Lewisham, S.E.
Woodward, Horace	Atlas Works, Great Charles-street, Birmingham.

The Secretary called attention to some specimens of a Miners' Safety Lamp, exhibited by Messrs. John Abbot and Co., Gateshead-on-Tyne. For description see page 164.

The Paper read was—

ON SOME RECENTLY-EXECUTED DEEP WELLS AND BORINGS.

By GEORGE R. BURNELL, C.E., F.G.S., F.S.A.

The remarkable success of the operations carried on at Passy, for the supply of the artificial waters of the Bois de Boulogne by means of an artesian boring of unusually large diameter, has lately revived the public interest in that class of operations, both on the Continent and in England. It has been proposed, indeed, to apply that system, on even a larger scale than was tried at Paris, to our own metropolis; and the scheme for sinking a series of deep wells in the various parts of London has been revived by some enthusiastic admirers of the results obtained by our neighbours. Experience has already decided the problem of the possible success of such attempts here, and it may, therefore, be desirable at the present day, to review briefly the history of artesian wells at home and abroad, in order to prevent the waste of money and the disappointment which may arise from ill-advised imitation of the measures proved to be successful in some cases, but by no means universally applicable.

The term "artesian well" means, strictly speaking, only a well sunk to a considerable depth, through a dry and impermeable upper stratum, to a lower stratum charged with water, under such conditions of pressure as to cause the water to flow over the surface of the ground. The first wells of this description mentioned in modern works on hydraulics were executed in the province of the Artois, in France, where they were sunk in the chalk formation, and were supplied by the streams running between the fissures of that deposit, which were fed by the infiltration from the higher ground of the great north-eastern chalk plateau of France. It is said that some of these wells in the Artois have been used for nearly a thousand years, without any perceptible diminution in their supply; but it must also be added, that the ancient Egyptians and the Chinese had, from the remotest antiquity, been acquainted with this method of obtaining water, and that the inhabitants of the plains of Lombardy have long used the waters rising from the deep-seated strata of the valley of the Po, for the irrigation of their "marcite," or winter meadows. Be this as it may, and without dwelling upon the locality where this description of well was first made, it seems that about the beginning of the present century great attention was drawn to them by the success of a number of borings, through the London clay into the sands of the basement beds of that formation, made in the valleys of the Lea, near Broxbourne, Waltham, and Tottenham, and of the Wandle, near Mitcham, Garratt, Wandsworth, &c. In the low-lying alluvial islands at the mouth of the Thames, some very deep wells were also sunk through the London clay, and a copious supply of fresh soft water was obtained; and, in fact, so many wells have been sunk into the water-bearing strata of the tertiary sands, that they have been nearly exhausted. Whilst these operations were being carried on in England, the French engineers had energetically adopted the system upon which they were

founded, and numerous artesian wells had been sunk at Epinay, Stans, and St. Denis, with similar results to those obtained near and in London, that is to say, that in the earlier wells the water, generally speaking, overflowed the surface, whilst in the later ones it rarely attained the level of the ground; and the water-line sank in the older wells in proportion as new ones were opened.

In 1833 M. Arago induced the Conseil Municipal of Paris to undertake the execution of a deep boring, in the hopes of obtaining a supply of water from the lower green sand formations, which he supposed to form a continuous bed under the chalk basin, underlying, in its turn, the tertiary strata of the neighbourhood of Paris. This lower green sand, in fact, outcrops from under the chalk on the whole of an irregular oval, passing from the north-east through the south, nearly to the north-west of Paris, and it approaches that city the most nearly at the point where the Seine forces its way through the overlying recent formations near Troyes, in Champagne. At Lusigny, the precise point of outcrop, the surface of the green sand is about 300 or 350 feet above the level of the plain of Grenelle, where it had been resolved to make the first attempt to traverse the tertiaries and the chalk. From this fact, MM. Arago and Walferdin inferred that the water from the green sand would flow over the surface at Grenelle, and they were encouraged in that opinion by the existence of numerous artesian wells carried through the chalk into that stratum from which they expected to obtain their supply at Elbeuf and Rouen. The depth it would be necessary to sink the new well constituted the unknown conditions of their undertaking; but not only MM. Arago and Walferdin, but also M. Mulot, calculated from the first, that they would find the chalk extend to at least 1,300 or 1,400 feet from the surface. So little, however, was known of the probable cost, or of the dangers and risks of these deep borings, at the time the well of Grenelle was commenced, that the municipality of Paris only voted a sum of 18,000 francs (£720) for boring three such wells.

On the 29th of November, 1833, the works of the Grenelle well were commenced by M. Mulot, and after encountering many serious difficulties from the nature of the ground, and from the fracture of the tools made to work at so great a distance from the surface, the able and scientific men who had supported M. Mulot through evil report and bad report, were rewarded by finally obtaining a copious jet of water from the lower green sand on the 26th February, 1841. The depth then reached was 1,806 feet 9 inches, of which 1,378 feet were in the chalk; the water rose at first at the rate of 800,000 gallons per day, to the height of about 122 feet (the level of the distributing reservoir of Grenelle), and its temperature was about 82° Fahrenheit. When it first rose to the surface, it contained large quantities of sand, clay, and other matters in mechanical suspension, and it was nearly twelve months before the water passages of the subterranean strata were sufficiently cleared to allow the water to rise in a state fit for distribution. On several subsequent occasions also, the sand has accumulated in such quantities, in the pipes lining the bore, as to render it necessary to draw and clean them.

This boring operation had been watched very carefully by English engineers, and even during its progress similar works had been attempted in our own country. As might naturally have been expected, the success of the Grenelle well, under these circumstances, induced our countrymen to continue their work with redoubled ardour, but unfortunately they have displayed less perseverance, and it is to be feared less skill, than our neighbours; for hitherto none of the deep borings undertaken avowedly for the purpose of obtaining a supply of water from the subereticaceous beds in either the London, or the Hampshire basins, have completely succeeded. In the case of the Kentish Town well, it is true that some very extraordinary and anomalous conditions of the strata have been found to exist, which have totally deranged all the scientific cal-

culations of the able geologists and well-borers consulted during its execution; but it has too often happened in England, that works of the kind we are now considering, have been undertaken solely on the recommendation of amateur geologists, or of "practical men," as it is the fashion to call those who are totally ignorant of recorded science; and the consequence has been that several very costly wells have been undertaken, carried on at great expense, and subsequently abandoned in despair, perhaps just at the moment when success was within grasp.

One of the earliest of the attempts made in England at sinking an artesian well to the lower green sand, was the one made, almost unintentionally, by the town of Southampton. It was commenced by a preliminary boring through the London clay to the chalk, which was reached at a depth of 480 feet from the surface; the upper strata traversed consisting of the sands, clays, and plastic mottled clays of the Hampshire tertiary series. It seems that the well-borer employed carried the boring to a depth of 50 feet beyond the surface of the chalk already mentioned, and he then reported that an ample supply of water was to be obtained from that formation. A shaft was sunk, on faith of this report, commencing with a cast-iron lining of 13 feet diameter, which it was proposed to carry to a depth of 160 feet, and then to commence boring with a hole of 30 inches diameter, diminishing gradually to 20 inches in the chalk. The cylinders used were, however, found to be too weak for the purpose they were intended to fulfil; they collapsed in places, and, in driving, they assumed a direction seriously out of the perpendicular. The contractor failed when the cylinders had been thus badly lowered to the depth of about 60 feet, and the works were then taken out of his hands, and placed in those of Mr. Docwra, one of the most able well-sinkers and waterworks contractors of our country and of our day. With great trouble he drove the shaft completely down to the chalk, finishing it with a clear external diameter of 9 feet 4 inches; part of it was lined with cast-iron plates, and part of it with brickwork in cement. The brickwork lining was carried three feet into the chalk, and below it the shaft was continued to the total depth of 562½ feet from the surface, in the solid chalk, without any lining, and with a clear diameter of about 7 feet; a boring was then commenced of 7½ inches diameter, and was carried down eventually to a total depth of 1,317 feet from the surface. The chalk formation was found here to have a thickness of 851 feet, and the works were suspended when the boring had traversed only 12 feet of the chalk marl. Now at Chichester, where Mr. Gatehouse had also sunk a deep well to the upper green sand about the same period, the thickness of the chalk marl was found to be 61 feet; the upper green sand and gault are of variable thicknesses, but the greatest depth recorded for them was that of the new well at Passy, where they were about 274 feet deep. It is, therefore, very probable, that if the Southampton well had been carried down 330 feet further, or to a total depth of 1,650 feet in round numbers, the problem as to the possibility of finding water from the lower green sand, in the Hampshire basin, might have been solved. In the well at Chichester this solution could be even more easily attained, for the boring had actually been carried about 130 feet nearer to the probable surface of the lower green sand, leaving only 200 feet still to be traversed.

It would be impossible to record all the important works undertaken of late years for obtaining water by means of artesian wells, but the circumstances connected with the history of those attempted at Calais, Kentish Town, and Harwich, are so singular, that it behoves us to dwell upon them. At Calais the well was sunk through the chalk, and the whole series of the subereticaceous strata, to a total depth of 1,047 feet from the surface, but no water was obtained from it, and the boring passed, at the depth above-named, into the transition rocks, in which it was carried for a further depth of 103 feet. At Kentish Town, the Hampstead Water Works Company endeav-

voured to secure an artesian supply, in order to comply with the provisions of the Metropolis Water Works Act of 1851. They had very wisely consulted Mr. Prestwich upon the geological questions involved in the preliminary inquiries, and they employed Messrs. Degoussé and Laurent, the best known and the most successful well-borers up to that period, on the Continent. Geologists and practical men alike in this instance reasoned that, because the lower green sand outcropped around the edges of the chalk basin containing the London tertiaries, in precisely the same manner that the lower green sand outcropped around the chalk basin containing the Paris tertiaries, therefore, there was every *à priori* reason to believe that the subcretaceous formations would continue under London, and furnish, as had been the case at Paris, the water for a well carried down to them. Acting upon this belief, the company commenced boring in the chalk, at the bottom of a shaft previously sunk to the depth of 539 feet from the surface. The boring was commenced with a diameter of 12 inches, reduced to ten inches in the intermediate part, and finishing with a diameter of 8 inches. The work began on the 10th of June, 1853, and was carried on with every appearance of success for a considerable time. The strata traversed were found to occur in their regular order, and of the anticipated thicknesses, until the boring had traversed the gault formation at the depth of 1,113 feet 6 inches from the surface; but when, as Mr. Prestwich said, everybody believed that "a very few more turns of the augur would tap the water-bearing sands of the lower green sand formation," it was found that the borings passed at once into a series of beds consisting of alternate layers of red sandstones, red clays, conglomerates, red sands, and rounded pebbles, which geologists are now disposed to class amongst the new red sandstone series. It is very difficult to form any decided opinion as to the real nature of a deposit which has only been explored by the boring tool, especially when the diameter of the bore was only eight inches, as at Kentish Town, and I confess that for my own part, as I said before in this room, and shall have occasion again to repeat, I am disposed to regard the beds of red clays and sandstones rather as being members of the Wealden series than of the new red sandstone. But in either case it was evident that the water-bearing strata were interrupted under London, and that there was no probability of obtaining a supply of any description from them in that district. In fact, the Hampstead Water Works Company, after the failure of this attempt, were compelled to sell their interests to the New River Company, and the well was stopped at the depth above quoted, added to the depth traversed in red sandstones and clays, or at a total depth from the surface of 1,302 feet.

About the same time that this unexpected result was obtained at Kentish Town, Mr. P. Bruff, C.E., was employed upon an attempt to obtain water for the town of Harwich, either by a deep well in the chalk, or by traversing, if necessary, the strata below the chalk. Several attempts appear to have been previously made at Harwich to obtain a supply from the chalk, but they had failed, in consequence of the infiltration of salt water into the wells sunk close to the sea shore. Mr. Lankaster Webb, of Stowmarket, a town situated upon the high lands of the valley of the Gipping, the main affluent of the Orwell, had executed a well 895 feet deep, through the drift clays and gravels over the chalk, the cretaceous formations, and the upper green sands and gault. I do not know the level of the ground at Mr. Webb's factory, but as a rough guess I should say that it was about 240 feet above the high tide level at Harwich; and I am not, therefore, surprised that the persons connected with the well at the latter town should have expected, that upon traversing the chalk they would meet with a supply of water under the true artesian conditions. It happened, however, that after the Harwich boring had passed through the drift, the tertiary strata, the chalk, the upper green sand, and the gault, to the depth of 1,025½ feet from the surface, it passed, not into the lower green sand, but into a

black slaty rock, which Mr. Prestwich pronounced to be a common grey slate of the palæozoic series, whose precise position in the series could, however, hardly be defined on account of the absence of fossils. Thus, at Calais, and I believe also at Ostend, the lower green sand is wanting, and is replaced by a member of the carboniferous series; at Kentish Town the lower green sand is absent, and it is replaced perhaps by the new red sandstone beds, whilst at Harwich the lower green sand is replaced by the very earliest clay slate rocks.

Now there may be drawn, from these unexpected results of the deep borings in the tertiaries of what may be specially named the London basin, some valuable scientific and practical conclusions. These may be briefly stated as follows:—1st. That at present, geology is only so far advanced as to enable us to state, with tolerable certainty, what we shall *not* find under the surface, but by no means to justify any positive assertion as to what we *shall* find: thus, knowing that the London clay is on the surface, we may be certain that the crag will not be found beneath it, but it by no means follows that necessarily the chalk, the lower green sands, the oolites, or the usually subordinate strata, should be there. 2nd. That the first attempt to sink an artesian well through a previously untried stratum, is at all times a hazardous experiment, and that it is, therefore, one which should never be tried by those who only work with the money raised by forced taxation. It was upon the latter ground that Mr. Ranger very properly recommended the town of Southampton to stop the philosophical experiment upon which they had already incurred so large an outlay; and it is certainly wiser to leave the solution of these problems to municipalities possessed of private resources, or to private enterprise, than to expend upon them the money wrung from the ratepayers. 3rd. And possibly this may be the most important conclusion of all—it would appear to be proved by the occurrence of the earlier strata in the geological series at Calais, Kentish Town, Harwich, and if I be not mistaken, at Ostend also, that Mr. Godwin Austin's theory of an upheaval of the carboniferous series existing between its extremity on the French coast, and its reappearance in the Bristol and the South Wales coal field is correct. A full discussion of this important inquiry would be misplaced in this paper, but I cannot refrain from repeating what I myself have said before, viz., that from all which is at present known, it would be more rational to seek for coal under London, than for soft water. At the same time I would carefully guard myself against any appearance of encouraging an attempt of the former description, unless it were distinctly undertaken as a speculation, with great, nay, almost infallible, chances of loss.

The next important artesian borings executed of late years in chronological order, were those undertaken under the superintendence of the French military authorities in the Desert of Sahara, avowedly for the purpose of forming stations for the caravans trading between Algeria and Central Africa. They were executed by means of tools made by Messrs. Degoussé and Laurent, who seem also to have occasionally acted as consulting engineers, but the works were actually performed by the soldiers, or the labourers employed by the "Corps du Génie Militaire." It appears that up to the month of June, 1860, no less than 50 of these wells had been sunk in the desert, and that they pour upon its thirsty surface no less than 7,920,000 gallons of water per day. Similar works were, according to Aimé Bey, executed in the deserts of Ancient Egypt, as was before alluded to, and there are good reasons for believing that the system of artesian borings might advantageously be applied in the deserts of north-western India, and of Australia.

Some interesting artesian wells and borings have also been executed in various parts of England and of the continent, to a few of which I propose to return hereafter, but, in the meantime, I pass to the description of the great work lately completed at Passy, as being the one which has attracted the most universal attention. When the

great works of the Bois de Boulogne were commenced, it was soon discovered that the pumps of Chaillot would not be able to furnish the quantity of water required for the lakes and waterfalls of the new park, and the Municipal Council of Paris, encouraged no doubt by the commercial results of the previous operation at Grenelle (which had eventually cost the sum of £14,000, and had repaid its cost several times over), resolved to execute a second boring to the lower green sand, in order to secure an independent supply. It was originally proposed to execute this well of the same dimensions as that at Grenelle, that is to say, to finish with an eight-inch bore; but before it was commenced, M. Kind, a German engineer, (who had already carried out some very important works upon a system, and by the aid of tools patented by himself,) offered to contract for the new well to finish with a bore of 2 ft. in diameter, and to deliver the water at 92 ft. above the level of the ground, at the rate of nearly 3 million gallons per day. He undertook to complete the work for the sum of £14,000 within the space of two years. After some opposition, based principally on the doubts expressed by engineers, who had been consulted on the subject, with respect to the increased delivery over that of the well of Grenelle, this offer of M. Kind's was accepted, and on the 23rd December, 1854, the vote of the Municipal Council in favour of the contract with him was passed. The work was commenced shortly afterwards, and by the 31st of May, 1857, the boring had already reached the depth of 1,732 feet from the surface, when suddenly the upper portion of the tube lining collapsed, at a distance of about 100 feet from the surface, and choked up the bore-hole. This accident delayed the completion of the work for three years, and led to the rescinding of the contract with M. Kind; but the engineers of the city of Paris were so satisfied with his zeal and ability, that they confided to him the conduct of the remaining works. A new well was sunk to a depth of 175 feet 4 inches, and the boring was then cleaned out and resumed. Much trouble was encountered in traversing the strata below the distance of 1,732 feet above quoted, and at length, at the distance of about 1,894 feet from the surface, the first water bearing stratum was met with, but the water, after several oscillations did not rise to the level of the ground. The boring was continued below this level, until, on the 24th September, 1861, at midday, at the depth of 1,923 feet 8 inches, the true artesian spring was tapped. When this spring rose to the surface, it discharged at the rate of 5,582,000 gallons per day. The yield has since then oscillated, but so long as the column had not been raised above the level of the ground, the total quantity does not seem to have fallen short of 4,465,600 gallons. The well of Grenelle, (which by the way had been falling off in its yield for some time before the completion of the Passy boring, no doubt on account of some obstruction in its ascensional tube, but which for several days before the 24th September discharged regularly 200,000 gallons per day,) fell, in about 30 hours after the Passy spring had been tapped, to a yield of about 173,000 gallons, at which rate it remained stationary, until the tube of the Passy boring was raised so as to allow the water to stand at the same height in the two wells, when the original rate of delivery of the Grenelle well was resumed, but the rate of delivery of the Passy well fell to two million gallons per day. It is intended eventually to cause the column of water of Passy to rise to a height of 1,977 feet above the bottom of the boring, or about 54 feet above the surface of the ground. The horizontal distance of the Passy well from the one at Grenelle is about 3,830 yards; and it will be observed from the section on the wall, that the water-bearing stratum is nearly 100 feet nearer the mean level of the sea at Grenelle than it is at Passy, whilst the surface of the ground is about 35 feet higher at the latter locality than it is at the former one.

Unquestionably the effect produced upon the respective sources of supply, by the alteration in the heights of the columns of water, proves that the wells of Passy and of

Grenelle are fed from the same stratum; and there can be no reason, therefore, to suppose that, when the Passy spring shall have cleared its water passages there should be any difference in the qualities of the waters at the two places. M. Peligot has carefully analysed the Grenelle waters, and he found that they contained 0.000142 of saline matters, composed principally of the carbonates of lime, potash, and magnesia, associated with a compound of sulphur, and of soda of variable proportions and conditions, and with the carbonate of the protoxide of iron and silica. The salts of the sulphate of lime, or of the more permanently insoluble description are absent, and it would appear that the gases diffused through the water are of considerable volume, the carbonic acid gas being one of the most so. There is a sensible evolution of sulphuretted hydrogen from both the wells of Passy and of Grenelle, and it is worthy of remark that the same gas is given off from the water in Mr. Gatehouse's well at Chichester, though in the latter instance the smell is sufficiently strong to render the water positively repulsive. At the present day the water at Passy is still foul, on account of the matters it brings up in suspension; but, as in the case of the Grenelle well, this inconvenience will no doubt soon disappear. The temperature at which it reaches the surface is identical in the two wells, and is about 82° Fahrenheit.

It may be worth while to call attention to the mechanical means adopted by M. Kind in sinking a boring of the large diameter of 2 feet 4 inches, to the enormous depth of nearly 2,000 feet from the surface. The work was commenced by a shaft, as usually is the case, and after it had been sunk to a depth of about 50 feet, the boring commenced, and was continued with as nearly as possible the same diameter to the bottom. M. Kind employed for this purpose what may be called rods with releasing joints, very closely resembling the joints introduced by Cuyenhausen, which allowed the cutting portion of the tool to be raised a certain height, and then to be released automatically; this arrangement was adopted in order to avoid the lashing of the sides of the bore by the long rods, and to regulate the force of the blow. The cutting tool used by M. Kind also differed from the tools generally employed, for it consisted of a single or a double trepan, according to the nature of the ground, instead of the ordinary chisels and augurs. A patent was taken out for these tools by M. Kind, No. 13,478, of the year 1854, the printed specification of which contains a series of engravings of the various modifications proposed for the various kinds of rocks; in the *Annuaire Scientifique* for 1861, illustrations will also be found of the ordinary trepans and of the slide joints. M. Kind is able, by these combinations, to strike as many as twenty blows in a minute with the greatest regularity at a depth of 2,000 feet. The patent of 1854 specifies also certain methods of lining the sides of the borings; but it must be confessed that they do not seem to me to possess any great merit, and indeed M. Kind had more difficulties to encounter at Passy from the collapsing of his tubes, than from any other cause. It is a common error of well borers to undervalue the effort exerted by clays swelling when charged with water; and the great delays encountered in sinking the Passy well were precisely caused by the false economy introduced in the execution of the tube linings. The time actually employed in sinking the Passy well was nearly the same as that employed at Grenelle; in the former instance it was 6 years 275 days, in the latter it was 7 years 90 days. The cost of the Grenelle well, as above stated, was £14,000; that of the well at Passy was £40,000, but it must be observed that the quantity of water, delivered at the same height in the two cases, is ten times greater at Passy than it is at Grenelle; the rates of delivery are, in fact, nearly in the direct ratios of the diameters.

I have not been able to learn whether the artesian wells of Elbeuf and of Rouen have been affected by the completion of the new well at Passy, and at present I am

inclined to believe that they may escape this action, on account of their proximity to the entering ground of the lower green sands, on the western margin of the cretaceous basin. At Tours, however, so many wells have lately been sunk (in an early edition of M. Degoussé's excellent *Guide du Sondeur*, that gentleman mentions that he himself had executed no less than sixteen of them), that the subterranean supply is becoming exhausted, and, as in the case of the wells supplied by the basement beds of the London clay, the lower green sand wells are gradually losing their artesian character. In two wells also, at Evres and Ferrières, the subcretaceous formations yielded no water; and in the latter the bore was even carried to a depth of 30 feet in the great oolitic, or jura limestone series, without obtaining a supply. I call especial attention to this fact, because it illustrates again the uncertainty at all times overshadowing the execution of the first deep wells in a particular district, and that the stratum which yields water in one locality is likely to be unable to do so in another. The enterprising gentlemen who are engaged at the Hastings well should bear this fact in mind, and though I believe that after they shall have traversed the lower members of the Wealden series, they are more than likely to find the upper or Portland oolite, which is of sufficient water bearing power to ensure them a good supply of water, they must also be prepared for disappointment. The Hastings well is already 553 feet deep, still in the Hastings beds, and as these have never yet been traversed, it is impossible to say whether they will be found to be seven or seventeen hundred feet thick. Most probably the former guess will be found to be the more correct, because the town of Hastings is situated at a low horizon in the series of Weald beds; but all operations of this description at Hastings must for the present be conducted in doubt as to the ultimate result, however strong may be the hopes of success. The character of the strata already traversed, and of those likely to be met with at Hastings, leads me to believe that M. Kind's processes would be particularly applicable there, but the success of such an operation would still be a mere matter of speculation, such as ought to be left to private enterprise.

I dwell a little on this point, because the Board of Guardians of Brighton are engaged upon a similar experiment, at a place called the Warren Farm, near that town. It is not my place to criticise the mode of execution adopted in carrying on this work, but I cannot refrain from saying that there are many things about it which seem to me to be in opposition to the opinions now entertained by scientific engineers, and I gravely suspect that, even if water from the subcretaceous formations should be obtained at this well, it cannot, by any possible chance, rise near the surface, which, at the Warren Farm, is not less than 410 feet above the mean tide level. It is inexplicable to me also, that this well should be continued by means of a shaft, at the great depth already reached, instead of by means of boring; and I regret bitterly to see an experiment, which has been carried on hitherto with so much spirit, compromised by what I consider the mistaken course latterly adopted. At Brighton, nevertheless, the only chance of securing a supply in the parts of the chalk basin lying beyond the influence of the faults or "cross throws" which have, for instance, enabled the Water Works Company to obtain, as is said, one million gallons per day, is to penetrate the chalk to the lower green sand. Notwithstanding the cost of the previous experimental borings in the surrounding countries, I am convinced that the cheapest manner of effecting this object would have been to have bored, rather than to have sunk a shaft, and even now the Guardians would do wisely to adopt this course, especially as theirs is really the first experimental shaft or boring on the east bank of the Arun. It is, however, a sad peculiarity of the municipal bodies of England that they are always disposed to listen to those whom it is the fashion to call "practical," in contradistinction to "scientific" men, as though the mere fact of working "by rule of thumb" gave men truer insights into the laws of nature than long study

and careful observation. At Brighton this seems emphatically to have been the case, and in a report addressed to, and received by, the Board of Guardians, the opinions of three practical well-borers are quoted as to the probable cost of continuing the well at Warren Farm, but no opinion seems to have been asked from such men as Mr. Hawksley, Mr. Mylne, or Mr. Homersham, who have brought great experience and deep study to bear on the hydrographical conditions of this district on other occasions. It is one of the fashionable theories of the day that a scientific education incapacitates a man for the exercise of a profession, and that the most able men in any branch of art or science are those who have not been brought up to pursue it. Under these circumstances it may not be surprising, however unfortunate it may be, to find empiricism preferred to science, or that the Brighton Guardians should avoid taking the opinions of really eminent engineers.

In stating, in the previous part of this paper, that I should return to the question of the abnormal beds met with at Highgate, I had especially before my mind's eye the cases of the well sunk under my own orders at Warnham Court, near Horsham; and at Red Hill, by my friend Mr. Docwra. In the former case, the boring, after it had been carried through the sandstones, clays, and shales of the upper Wealden deposits, passed at a depth of 142 feet from the surface into a bed of red clay and sandstone intermixed. At first, I believed, from the external characters of the materials, that they were of the same nature as the beds found at the bottom of the Kentish Town well, and I was supported in this opinion by several distinguished geologists to whom I showed the samples. As the Kentish Town beds were, at the time I refer to (about five years since), universally considered to be members of the new red sandstone series, of course I regarded the Warnham bed as one of the same range. But Mr. Docwra, at Red Hill, after he had traversed the sands and loams of the subcretaceous series to a depth of 438 feet, passed into a bed composed of red clays and particles of red sandstone, which were identical with the Warnham beds, and with some members of the Wealden series. It seems, therefore, to me to be very probable that the Kentish Town beds may be members of the Wealden series, but the solution of this question has simply a geological interest, for alike, the Weald clays, and the new red sandstone clays, are without water; and, under these circumstances, the wisest course to be adopted was to stop the further progress of the works in all such cases as Warnham and Red Hill, unless they were carried on distinctly as philosophical experiments.

The well at Rugby, though it has proved to be, no doubt, a source of annoyance and disappointment, may eventually turn out to be of importance to the commercial interests of the locality. It was commenced with the hope of finding in the new red sandstone series under the lias, some water-bearing strata which might be able to furnish a supply to compensate for the deficiency under which the town of Rugby was suffering, after it had been put to the expense of carrying out the absurd crotchet of the so-called "gathering grounds" system. A boring has here been carried down to a great depth in the new red sandstones of the triassic group, which, at Liverpool and Birkenhead for instance, frequently supply large quantities of water. At Rugby, however, the boring at present has only yielded a brackish water, and I suspect that now all hopes of securing the result desired by the Local Board of Health by this well must be abandoned, unless the Board determine upon tubing the bore-hole throughout its length, and upon continuing to sink to a much greater depth. It is possible that, within a moderate distance from the bottom of the present well, stronger brine springs than those now brought to the surface may be found, which it would be possible to evaporate economically for the purpose of salt making; but a very careful comparison between the strata of this locality and of those near Derby or Droitwich, would be required before any decided opinions could be formed as to the probability of finding

soft water within a reasonable distance from the surface at Rugby.

The well at Great Yarmouth, executed by Sir E. Lacon and Co., is of interest, on account of its showing the great depth attained by the tertiary strata on the east of England; but, unfortunately for the spirited proprietors, the results, so far as water supply is concerned, have been "negative." The depth of the tertiaries here was found to be 527 feet, and the first 170 feet of this thickness were composed of recent estuarine and blown sand, deposits of very recent formation. At Norwich, Messrs. Colman are steadily pursuing an experimental boring, which has already passed through the chalk to a depth of 1,158 feet, the upper green sand to a depth of 8 feet, and the gault to a depth of 30 feet; the works have been suspended in this formation on account of some accident to the machinery, but when this shall have been repaired, they will, no doubt, be resumed. It may be necessary to descend 150 feet lower before reaching the water-bearing stratum, but the comparative success of Mr. Lankester Webb's well, at Stowmarket, affords good reason to hope that Messrs. Colman's perseverance will ultimately be rewarded. I do not anticipate, however, that the water will overflow the surface, because the lower green sand is traversed by one of the affluents of the Ouse, near Downham market, at a comparatively low level.

In a paper which I had the honour of reading in this room last year, I alluded to the very successful borings made by the Kent Water Works Company, in the Ravensbourne Valley, and this evening I am enabled to lay before you a section, showing the strata they traversed. One reason for my doing so is, because I have heard that some parties propose, as I said in the opening paragraph of this paper, to sink artesian wells near London for the supply of the metropolis; and I think it desirable to state, for their guidance, that, unless they meet with the peculiar conditions of the faults of the Ravensbourne Valley, they are not likely to obtain a large supply of water from the chalk on the north side of the Thames, whilst there is no chance whatever of their finding water below the chalk. There are, no doubt, copious and beautiful springs given off from the head valley of the Lea and the Coln, both of which rise in, and are fed, by the chalk; but those springs may, in almost all cases, be shown to be connected with some geological disturbance of the strata, and the only locality near London where there seems to me to be any chance of obtaining a large quantity of water from the chalk, would be on the left bank (or the west) of the river Lea, somewhat to the north-east of Stratford, because there is about that district a line of disturbance in the chalk parallel to the great fault which brings to the surface the springs lately tapped near New Cross, and those of Grays, in Essex.

Finally, it must be evident to anyone who reads attentively the records of the success and of the failure of the attempts above-mentioned, that the execution of artesian wells is an operation which should only be entrusted to skilful and well-tried men, acquainted with the theory and practice of their art. No such work should be commenced without a careful preliminary survey of the geological and hydrographical conditions of the country extending over a very wide range. This is seldom done, because public bodies, in England at least, do not seem to object to pay for engineers' blunders and miscalculations, but they do object to pay for their study, and it is at once assumed that because artesian wells have succeeded in one case they must succeed in all. But even when the greatest amount of skill and science have been brought to bear on the preliminary investigations for the establishment of an artesian well, it is impossible to predict with any certainty what the result of sinking a shaft or a boring may be in a stratum hitherto untried. Moreover, every artesian source of supply is limited in amount, and even in the case of the Paris basin it would be desirable to watch the effects of the increased draught upon the lower green sand during a dry summer, especially before commencing, as has been pro-

posed, the execution of a large number of wells like those of Passy and of Grenelle.

The student who may desire to obtain a complete view of the subject thus briefly referred to, would do well to consult the works of Messrs. Prestwich, Mylne, Clutterbuck, Homersham, Degoussée, Burat, Héricart de Thury, Garnier, &c., the Transactions of the Institution of Civil Engineers, the Comptes Rendus of the Académie des Sciences, and of "Les Ingénieurs Civils" of France. I am myself under great obligations to Messrs. Hawksley, Lockwood, Wells, Chamberlain, Docwra, Prestwich, Morris, Snider, and others, for the sections and information so liberally supplied to me.

I may here add that in the number of *La Presse Scientifique*, for the 16th January of this year, I find a notice of a well lately sunk at Columbus, Ohio, U.S., which is not less than 2,575 feet deep. The thermometer (on the system invented by Mr. Walfertin) registered a temperature of 88°; this would seem to show that the law of the increase of temperature is rather slower in Ohio than it is near Paris. No particulars are, however, given of this important boring.

DISCUSSION.

Mr. ROBERT RAWLINSON (responding to the invitation of the Chairman) felt personally obliged to Mr. Burnell for his paper, and for the facts laid before the meeting, but would have preferred that it should have been divested of some appearances of personality in the remarks with regard to the acts of municipal corporations, and other local public bodies. A great number of facts had been brought before them, which served, he thought, to teach them a considerable degree of modesty in coming to conclusions on these matters. They might, however, draw this conclusion, that it did not follow, because water was found under certain conditions in one locality, that operations of a similar character, and under apparently the same conditions, would be attended with equal success in another locality. With regard to failures, he thought the Rugby instance had been very gently and tenderly dealt with. That well was sunk at great cost, but they failed to get fresh water. They could only pump brine from it, which, they were told, might be turned to a profitable account if they could get enough of it. The wells at Paris must be pronounced a great success, as far as they went, but if they thought they could sink wells 2,000 feet deep in this country and obtain water under the same conditions, the probability was that nine attempts out of ten would prove failures. They might take it as a fact, that there was no fresh water beneath the surface of the earth's crust, which had not come from the surface. There was no water which they could obtain, fit for domestic purposes, which was not evaporated from the ocean, and they might take it that, under all circumstances, the greater the depth of the well was the more worthless for those purposes was the water; in the majority of instances water drawn from deep borings would be more highly impregnated with mineral matters than water obtained nearer the surface. It was found that chalk waters generally had about the same degree of hardness under all conditions; for every million tons of such water they had a ton of carbonate of lime. If they sunk a well in the chalk they must take into account that they would bring this carbonate of lime with the water. The same might be said of the new red sandstone, which generally gave water of some known hardness. Dr. Angus Smith, after having analysed many hundreds of samples of water, said if they told him the nature of the stratification he would tell them what the water was, or by analysing the water he would tell them what the stratification was. In advocating deep wells, they must take into consideration that the water would be charged with mineral matters almost in proportion to the depth of the well. He thought great fallacies were entertained with regard to the water-bearing power of the earth. He had

heard it said that they had only to go deep enough to get water in abundance. That was not correct. Take the new red sandstone series: they would have an abundance of water at a depth of 300, 600, and in some instances 900 feet. In sinking deep coal shafts—as in the case of the Monkwearmouth mine, which was 1,800 feet deep, they were troubled with enormous quantities of water at the depth of 900 feet; but at the depth of 1,800 feet they had to send water down for use in the pit. The same might be said of the deep shafts at Dukinfield, near Manchester. They had large water-bearing strata at from 600 to 900 feet deep, and having sunk beyond them, the strata were perfectly dry. The only filtration there was brine of the strongest character. Some time ago he was down the Monkwearmouth mine, and there was a small trickling of water down the sides of the shaft, which proved to be a strong brine, whereas at the depth of 600 feet they tapped enormous volumes of the ordinary magnesian limestone water. Now, any person who had practically to do with wells, would soon find that it was easy to read up all that could be said on the question, but the difficulty was to put it into practice. He had recently been engaged in sinking several wells himself, and had come to grief with one or two of them. He had a well now on his hands which had been nearly two years in work, and cost £2,000, but it had failed from the collapsing of the cylinder in the quicksand. The practice of artesian boring and well-sinking was one which might be of the greatest possible use in different regions of the earth; and it was a great thing to find that in the sterile deserts of Arabia, water could be obtained in many parts; and he had no doubt in many other regions where the surface was arid, if proper attention was paid to the stratification, water in moderate quantities might be found.

Mr. ROBERT MYLNE would bear his testimony to the value of the paper they had heard—a paper full of important facts. The illustrations on the walls were also valuable from having all been drawn to the same scale. There was one thing with regard to the Brighton well which had struck his attention—that was the breaking of the vertical line in sinking the shaft by forming a short horizontal gallery some way down, and constructing the lower portion not in a direct line with the upper. He should be glad if Mr. Burnell, or any other gentleman present, could inform them why so extraordinary a course had been adopted in that instance, as it struck him that considerable inconvenience must arise from it. One other remarkable feature of that well was, the great depth to which the shaft had been carried instead of boring. He had never heard of a shaft being carried down 1,100 feet, unless there was some peculiar object to be gained.

Dr. MOSSOM MEEKINS suggested that it would be interesting to know what amount of money had been expended on these wells, and with what results. He did not agree with Mr. Burnell in the statement that municipal bodies were not justified in sinking such wells. He thought it was a question with the ratepayers alone, and if they did not complain, no one else had a right to do so. He thought it a libel in the present day to say that professional education did not carry its due weight. Frequent cases were met with of uneducated ability in particular branches of science, and in such instances he thought every facility should be given to those who displayed that ability. Such men would be ornaments to any profession, and he thought there never was a time when scientific knowledge was valued so highly as at the present day.

Dr. LANKESTER, F.R.S., said this was rather an engineering question than one bearing upon public health or other subjects to which he had specially devoted his attention. But he felt a great interest in some of the wells spoken of, inasmuch as two which had been mentioned in the paper were sunk by relatives of his, and he was well acquainted with another. He especially referred to the wells at Southampton, Stowmarket, and Harwich. With regard to those examples, he thought it

was interesting to find that in the paper, particulars as to the causes of the failure of these wells were given, which could hardly be got on the spot. With regard to the Southampton well, he believed it was a moot question whether the failure arose from an interruption of the water-bearing strata at that spot, or whether it was from the geological structure of the whole country. General James had sunk a well at Portsmouth, from which he succeeded in obtaining a full supply of water; and he (Dr. Lankester) believed that at the time the Southampton well was commenced, the General gave his opinion that it would not succeed on account of its geological position. He mentioned this to show that the well at Southampton was commenced apparently without sufficient scientific consideration of the subject to warrant the large expenditure that had been incurred upon it, and he thought it highly improbable that any considerable amount of water would be got from that spot. On the other hand, the Stowmarket well was a great success, and he had a favourable opinion of it before it was commenced. With regard to the Harwich well, it was remarkable that it should have been undertaken so near the harbour and the sea; under such circumstances one might almost anticipate failure. The failure was attributed to the boring having reached the clay slate rock spoken of in the paper, which appeared to be almost a primitive rock, as hard and as brittle as any rock in Wales would be. Considerable doubts had been raised as to the nature of that rock. Some persons had supposed it to be an exceedingly hard portion of gault, and if that were bored through it was thought soft water might be obtained. He thought if they had gone deeper they would have got water. There was another well at Walton-on-the-Naze; he was not aware whether that had succeeded or not. Looking at the whole of these sinkings, they were rather discouraging, with all the knowledge that had been brought to bear upon them, for in the majority of instances they had been failures. This showed how careful persons should be before they commenced the expenditure of large sums of money on such works. At one time, he entertained the notion that they might derive a large proportion of the water supply of London from artesian wells. The authorities of St. James's, Westminster, proposed to sink a well in that parish, in order to obtain a supply of water, and the opinion of Mr. Godwin Austen was decidedly favourable to their being able to obtain a large supply in that district; however, the rights of the water companies seemed to frighten the authorities, and the plans were never carried out. In some districts of the metropolis he thought this system might be prosecuted with every probability of success, but in other localities they might meet with difficulties. The Kentish-town well was an extraordinary instance of want of success. One great element in this question was the nature of the water obtained from these sources. It was true the lower they got into the chalk, or through the chalk, the more the water became charged with inorganic constituents; but he would say those constituents did not render the water much less desirable for drinking. The human blood itself contained no less than 480 grains of saline matter per gallon, and for the most part those were the constituents of the inorganic impurities of the water, and, therefore, these could not be so objectionable as was sometimes represented. But organic constituents in water were objectionable, and in that respect the deep wells had the advantage over the shallow ones. No doubt in shallow wells there were dangerous impurities from the surface water which got access to them, and those organic matters in a state of decomposition would produce injurious effects upon the human system. Hence he said, avoid surface water wells. There was, however, a certain amount of organic matter in the water of deep wells. It occurred to him that the sulphuretted hydrogen which was detected in the wells of Grenelle and Passy had arisen from a small quantity of organic matter in the water. He did not know that that was injurious to health, at the same time, when the presence of sulphuretted hydrogen was

indicated, the water ought to be closely looked to, but a small quantity might sometimes occur without necessarily producing disastrous effects on the human system, and without indicating any great amount of organic impurity. It seemed if they could get supplies of water from these deep wells, it would be more free from organic matter than the water obtained from the rivers, owing to the latter being exposed to the impurities of animal and vegetable matters, and it was no doubt desirable that the water of towns should be supplied from these deep wells, if it were possible to obtain an adequate supply from such sources. He hoped that clear principles would be laid down, so that public bodies might not be deterred from prosecuting these works by the apparent difficulties which beset them.

Mr. ROBERT HUNT, F.R.S., remarked that his friend who had just addressed them appeared to be alarmed at the public drinking the water at present supplied to our towns, owing to the organic matter which it contained. There was no question but that in a great metropolis like this the surface water was rendered injurious from a variety of causes. He could not, however, agree with Dr. Lankester in condemning the deep well water in which they had the presence of sulphuretted hydrogen, as indicating organic matter likely to be injurious. He would mention that water taken from wells in the neighbourhood of the town of Leeds when first drawn was beautifully clear, free from smell, and altogether agreeable. In from six to twelve hours after it was drawn it became very offensive, possessing the offensive odour of rotten eggs; but if they allowed the water to stand twelve hours longer it became inodorous and delicious, the hydro-sulphate of lime was precipitated, and all that was offensive disappeared. He had known the same peculiarity to have occurred in water drawn from the deepest mines in Cornwall at a depth of 200 fathoms, which, when exposed to the action of the air at the surface, gave indications of sulphuretted hydrogen, but he discovered that it was the hydro-sulphate of ammonia which gave out that peculiar odour. In all cases of water from the deep mines of Cornwall—and he had no doubt it would be found to be the case at Grenelle and Passy—they discovered that this was due to the decomposition of iron pyrites, being brought into contact with some form of carbonaceous matter, such as was found in the coal formations; but he believed such water as that might be drunk without any injury to health.

Dr. LANKESTER explained that he had extensively investigated this subject in Yorkshire, and he did not think that the effect referred to was produced by the decomposition of sulphide of iron, but probably of a sulphate; it was only the soluble sulphates which produced sulphuretted hydrogen.

Mr. MASON would add his testimony to the uncertainty of the quality of water obtained from deep borings. He had been engaged in boring through the chalk at Tilbury, and he obtained water which was very salt at a depth of 580 feet, and strongly impregnated with iron. At Battle Bridge, in Essex, the water, when first drawn, was pure and agreeable to the taste, but, like that described by Mr. Hunt, had an offensive odour afterwards, again becoming pure. It was satisfactory to know that if they could not obtain water for the supply of the metropolis from a great depth, they could obtain it from the surface of the chalk. From the well at Grays, 4,000,000 or 5,000,000 gallons per day were discharged into the Thames, which water was perfectly free from organic matter. There was a large supply of water in the chalk, available to help the present water supply of London.

Mr. ROBERT RAWLINSON wished to add a remark with reference to the well at Harwich. The failure of that well had been imputed to its having been sunk at or near the level of the sea, without provision being made to exclude the salt water. It did not follow that because the stratification was at or near the level of the sea, if proper means were taken to exclude the salt water, they could not reach the fresh water, and bring it to the

surface. Neither ought such a circumstance to deter them, for the future, from sinking wells at or near the level of the sea for fear of tapping the salt water in the well they were going to sink. There was a well at Worthing, commenced by Mr. Ranger, which was 30 feet above the level of the sea. It had been sunk and bored to the depth of 360 feet into the chalk stratification. It yielded chalk water from the commencement, which afterwards became more abundant and of better quality. As a rule, it would be found that the water-bearing stratum was not confined to the sea level. The land was above the general sea level. The fresh water due to evaporation, flowing from the surface, was received as into a basin; the surface of the basin being for the most part above the sea level, the delivery of the water was at or below the sea level, and a great quantity was delivered along the margin of the rivers and sea shore. He knew that there was a fear of sinking wells at or near the level of the sea at Brighton and at Dover, under the apprehension that they would get at the salt water. He believed they might go to the depth of 100, 200, or 300 feet below the level of the sea without fear of touching the salt water.

Mr. ROBERT HUNT wished to mention one fact—that was that salt water filtered through sand became perfectly fresh. Although it was true they got the largest portion of well-water from that which flowed upon the surface of the earth, yet they also obtained a large quantity from the infiltration of water from the ocean. In the mines under the Atlantic Ocean, the water having filtered through 30 fathoms of rock, became nearly fresh. The experiments of Dr. Normandy proved that salt water filtered through 50 feet of sand came out fresh.

The CHAIRMAN concurred in the observations just made, because he had been engaged in works at Spithead, about a mile from the shore, and he found they were getting fresh water there. He also concurred with what had fallen from Mr. Rawlinson. It was not a question whether they bored near the sea or quite inland, if they went far enough into the earth to get beyond the reach of the sea water. With respect to the sinking of wells generally, his impression was that persons did not usually resort to that mode where they could avail themselves of supplies from the streams and rivers, but there were many cases where the rivers could not be made available, and then the supply of water became in a great measure matter of speculation, and it was problematical whether the speculation would turn out profitable or not. So he believed it would continue to be the case with regard to these wells; at the same time it was proper that they should avail themselves of all the information they could get on the subject, whether scientific or otherwise, so as not uselessly to expend large sums of money, whether that of corporations or private persons. There were several important considerations bearing upon the question of supplies of water from artesian wells. In the first place, in providing for the supply of water to a large town, the quantity obtainable ought to be known, whereas, in the case of artesian wells, the supply was unknown and the quantity might be limited. Nobody could tell what quantity the reservoir of an artesian well contained. That was an uncertainty which belonged to the supply of water from such sources. He had seen plans for supplying London with water from a well at Watford, which it was alleged could be done without affecting the river Colne. He believed that to be fallacious. If they began to take away from the constant quantity, which could only be supplied from rainfall, they must at last pump water even from the artesian wells which had been derived from the surface. They found in London the wells were lowering considerably, and the same was the case at Liverpool, and therefore he should be sorry to see the attempt made to supply London with water from wells of this character. There could be no doubt it was a question of quantity, which was one that they could not ascertain, and the quantity might be rapidly

diminished if they increased those wells to any considerable extent, and he thought that was an additional circumstance to deter them from endeavouring to adopt this mode of supply. He begged to propose a vote of thanks to Mr. Burnell for his able paper.

The vote of thanks having been passed,

Mr. BURNELL, in acknowledging the compliment, replied to the observations of Dr. Lankester with regard to the Harwich well, describing the nature of the strata there. Having offered some general observations upon the increase of mineral admixtures in proportion to the greater depth from which the water was obtained, he concluded by thanking the meeting for the manner in which his paper had been received.

The Secretary announced that on Wednesday evening next, the 5th February, a Paper by Dr. F. Crace Calvert, F.R.S., "On the Improvements and Progress in Dyeing and Calico-Printing since 1851," would be read.

LITERARY AND ARTISTIC COPYRIGHT IN FRANCE.

The *Moniteur* of the 23rd inst., announces that the Commission on literary and artistic property, appointed by Imperial decree of the 28th December last, met on Wednesday, under the presidency of Count Walewski, with Count Persigny and M. Rouland as vice-presidents. The official journal reports in full the speech delivered on the occasion by the Minister of State presiding, from which we gather that it is intended to extend the rights of authors from the present limit of thirty years after decease, either to fifty, or to perpetuity. The idea of the Imperial Government evidently is to prolong the author's right to the farthest term. In the course of his address, Count Walewski remarked:—"When we think how few men, but what men, would benefit by this just favour, we ask ourselves what danger there would be in making a law that should eternally protect some rare *chefs-d'œuvre*, whilst so many pooresses die before their authors—when so few survive them to the term of thirty years, for them too distant, whilst it is but a first stage to those that are to live for ever! Seeing that the works of great masters have been doing honour to France for more than two centuries—that they are enriching the booksellers who publish them, and the theatres who play them—how is it to be understood that they should not nourish the heirs of their illustrious creators. Time soon wears off with itself bad works, while as to good, it seems just that they should be as productive as they are durable, and that their fortune should have no other limit than that of their value and success."

The conclusion of the speech was as follows:—"The Commissions of 1825 and 1836 declared in their reports that in principle they were favourable to perpetuity, and that they shrank from it solely on account of the difficulties that would result from its application. Before them, illustrious names had spoken to the same purpose—Diderot, Voltaire, the Advocate-General Séguier; at a later period, Count Portalis, de Montalembert, Victor Hugo, and Philippe de Séguier; and in 1841, the reporter on the law presented to the chambers a proposal for extending the right of literary property to thirty years. Hear what M. de Lamartine says in a last effort in favour of perpetuity:—'I demand fifty years for the rights of intellect, because I feel that perhaps the moment is not yet come to grant it more; but, on the day that you proclaim the perpetuity of literary property, you will have emancipated human thought.' Is that day come, gentlemen? Have the objections that were offered against the application of the principles of common right to literary property lost none of their value? Is it now allowable, in the state of our laws, to consecrate the right which the authors of literary and artistic works ought to have, like the authors of every

other production, of disposing freely and in perpetuity of the fruit of their labour? I said to you at the commencement, gentlemen, and I say to you again, to you it belongs to settle these grave questions. The Emperor awaits the results of your labours. Confiding in your intelligence, his Majesty cannot doubt that from the discussion about to open will issue the solution most favourable to the true interests of literature and the arts."

After this address, which was listened to with the deepest interest, the general discussion was adjourned to a future sitting.

THE MOZARD MINER'S SAFETY LAMP.

The body of this lamp is provided with a male screw, and the frame supporting the upper portion or top has a corresponding female screw. This frame has a cavity to receive a bolt, which is forced into it by a spring, and the top of the bolt having an inclined surface, it follows that when the lamp is lighted the top can be screwed on, but cannot return unless the bolt be lowered. The axis which carries the wheel for raising the wick has a projection which, upon the wick being lowered as far as possible, depresses the bolt; this lowering of the bolt, cannot, however, take place until the wick is drawn completely within the tube and extinguished. The lowering of the bolt whilst the wick is alight is effectually prevented by providing that the wheel for raising the wick cannot make more than seven-eighths of a revolution. This, if such a wheel be one inch diameter, will allow two-and-a-half inches of wick to be burned before re-trimming the lamp, and is calculated to burn continuously for eighteen hours. The lamp has a solid iron chimney in the gauze top, so that it is impossible either to remove the top or to draw the flame through the gauze. The glass is about three inches in diameter, and one-quarter of an inch thick, and the supports which carry the upper parts of the lamp would prevent the glass being broken, unless wilfully. The double plate above the gauze keeps the hand ring cool.

Proceedings of Institutions.

BROMPTON CHURCH OF ENGLAND YOUNG MEN'S SOCIETY. —In the eleventh annual report of this Society, presented at the annual meeting, on the 28th of October last, the Committee say that though they have not to speak of any considerable progress, they trust it will on the whole be found to be satisfactory. The number of the members remains about the same as last year. Several new members have been elected, but not more than to fill up vacancies occasioned by death and removal. The lectures, an important branch of the Society's operations, have been better attended during the last year than formerly, and the best thanks of the members are due to those gentlemen who kindly gave their services gratuitously. The following lectures were delivered during the past year:—Major Lovell, C.B., R.E., "Popular Delusions;" Captain Drew, 3rd Depot Battalion, "The Ten Persecutions of the Early Christians;" the Rev. D. Cooke, "Tyndall and our English Bible;" the Rev. D. D. Stewart, M.A., "Home;" Lieut. D. C. Walker, R.E., "Climate;" the Rev. J. B. Owen, M.A., "Haunted Houses, with Sketches of the Spirits in the School, the Tap, the Asylum, the Lone House, the Fast House, and the Last House;" Benjamin Shaw, M.A., "The House of Commons;" the Master of the Temple, "The Life and Character of Bishop Heber." The result of the Society of Arts Examination has proved equally successful with that of the former year, six members having obtained certificates. The Committee trust that as the Society of Arts Examinations are better understood, a larger proportion of young men will be found to offer themselves as candidates for the certificates and prizes annually distributed. To those gentlemen

who form the Local Board the best thanks of the Society are due for the kind and efficient manner, in which they have conducted the examinations. The library catalogue contains a list of 600 volumes. There is, however, an increasing demand for new and useful books. The Committee venture to make their wants known in the hope that honorary members and friends of the Institution may be induced to present works to the library, or to give donations towards this laudable object. The periodicals still continue to be highly appreciated amongst the members. The weekly change at the members' houses without any additional charge is a peculiar feature of this Society, and gives the greatest satisfaction. The Committee urge upon the members of this Institution the importance of giving greater publicity to the circumstance that ladies are admitted as members, are free to attend the lectures, and to enjoy the advantages of the library. A Literary Class was formed at the beginning of last year, of the progress of which the Committee are able to report favourably. Other classes the Committee hope may be opened so soon as a sufficient number of names are forwarded to the Secretary. In conclusion, the Committee, in urging upon all the members hearty co-operation in this work, say:—"We unite ourselves to this Society for our own individual advantage and improvement, but this is not all, we are combined together for a common object, to make aggression upon the ignorance and immorality around us. We ask young men to join us, not only that they may find a common centre of sympathy, but that they may become workers with us to promote the religious, moral, and intellectual improvement of those amongst whom we dwell."

LOCKWOOD MECHANICS' INSTITUTION.—The annual gathering of the members and friends of the Institution took place on Christmas Eve. In the unavoidable absence of the President, Bentley Shaw, Esq., J.P., the chair was occupied by Mr. S. Lodge. The chairman stated that a prize had been kindly offered by Mrs. Bensted to any girl in the sewing classes for the best made shirt. Mrs. Bensted's object was to encourage sewing, &c., amongst the girls of the Institution, and he, the chairman hoped they would show by their future diligence and industry a proper appreciation of her kindness. He would urge upon the boys also the necessity of attending the classes regularly and punctually, with a view to compete for prizes, for he believed there were gentlemen in the neighbourhood ready to follow Mrs. Bensted's example. The proceedings were varied by singing and reciting, and the evening was spent in a very satisfactory manner. Mr. John Liversedge presided at the piano.

MEETINGS FOR THE ENSUING WEEK.

MON.....Geologists' Association, 7. 1. Mr. C. B. Rose, "Cretaceous Group of Norfolk." 2. Mr. C. Tomlinson, "Plasticity of Clay."

Entomological, 8.

British Architects, 8.

Medical, 8½. Mr. Henry Smith, "On the Difficulties and Dangers attending the operation of Tracheotomy."

Royal Inst., 2. (General Monthly Meeting.)

TUES....Civil Engineers, 8. Renewed Discussion "On Iron-Plated Ships."

Pathological, 8.

Photographic, 8. (Anniversary Meeting.)

Ethnological, 8.

Royal Inst., 3. Mr. John Marshall, "On the Physiology of the Senses."

WED....Society of Arts, 8. Dr. F. Crace Calvert, F.R.S., "On the Improvements and Progress in Dyeing and Calico-Printing since 1851."

Geological, 8. 1. Mr. E. Hull, "On Isodiametric Lines as means of representing the Distribution of Ordinary Sedimentary as distinguished from Calcareous Strata, with special reference to the Carboniferous Rocks of Great Britain." 2. M. P. de Tchihatcheff, "On the Recent Eruption of Vesuvius."—Communicated by Sir R. I. Murchison. 3. Sign. L. Palmieri, "On some Volcanic Phenomena observed at Torre del Greco."

Pharmaceutical, 8.

THURS....Royal, 8½.

Antiquaries, 8½.

Linnean, 8. 1. Mr. John Lubbock, F.R.S., and L.S., "Notes on the *Synanthuridae*." 2. Mr. A. Murray, "On the Geographical Relations of the *Coleoptera* of Old Calabar."

Chemical, 8. 1. "Mr. Adie, 'On Ground Ice.'" 2. Dr. Bence Jones, "On Crystalline Xanthin in human urine." 3. Mr. A. H. Church, "On Silica." 4. Prof. Bloxam, "On Arsenic in Sulphuric Acid."

Royal Soc. Club, 6.

Artists and Amateurs, 8.

Royal Inst., 3. Professor Tyndall, "On Heat."

FRI.....Royal Inst., 8. "Prof. T. H. Huxley, 'On Fossil Remains of Man.'"

Archæological, 4.

SAT.....Roy. Botanic, 3½.

Royal Inst., 3. Rev. A. J. D'Orsey, "On the English Language."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, January 17th, 1862.]

Dated 1st January, 1862.

16. W. E. Newton, 66, Chancery-lane—Imp. in coffee pots and boilers for culinary purposes, part of which imps. are also applicable for generating steam. (A com.)

Dated 2nd January, 1862.

18. W. E. Gedge, 11, Wellington-street, Strand—Improved apparatus for roasting coffee. (A com.)

21. M. Cartwright, Carlisle—Imp. in the manufacture of models and of "plates" or "pieces" for artificial teeth.

23. H. Eschwege, 44, Mincing-lane—Imp. in treating wood and other vegetable spirit.

Dated 3rd January, 1862.

24. E. Nugent, Brooklyn, New York, U.S.—Imp. in fire-arms.

26. F. S. Belloche and H. Bollack, 42, Bridge-street, Blackfriars—An improved parabol.

Dated 4th January, 1862.

29. J. W. Arundell, 265, Gresham-house, Old Broad-street—An improved method and improved apparatus for removing impurities from coal, parts of which invention are applicable for the separation and cleansing of ore and other minerals. (A com.)

31. C. Cross, Stratford, near Manchester, and E. Padmore, Manchester—Imp. in the manufacture of piled fabrics and in machinery or apparatus employed therein.

33. G. Leyshon, Tivdale, and D. Beckley, Brockmoor, Staffordshire—An imp. or imps. in breaks for retarding and stopping carriages on railways.

37. A. Warner, 31, Threadneedle-street—Imp. in preparing materials for and in purifying coal gas.

Dated 6th January, 1862.

40. G. Betjemann, G. W. Betjemann, and J. Betjemann, Pentonville—Imp. in dressing cases, applicable to other cases and boxes.

41. P. B. O'Neill, Hart-street, Bloomsbury—Imp. in screw wrenches or spanners.

43. F. Brown, Luton, Bedfordshire—Imp. in kitchen ranges and cooking apparatus.

Dated 7th January, 1862.

45. J. Higgins and T. S. Whitworth, Salford, Lancashire—Imp. in machinery or apparatus for spinning and doubling cotton and other fibrous materials.

48. A. Wallis and C. Haslam, Basingstoke, Southampton—Imp. in rotary screens.

Dated 8th January, 1862.

49. D. Beale, 10, Cobden-street, Saint Leonard's-road, Bromley, Middlesex—An improved mode of fastening iron plates to ships' sides.

51. A. Heath, 12, Union-square, Islington—Imp. in the construction of inkstands.

53. C. Pilkington and T. Pilkington, Sheffield—Imp. in skates.

55. J. Stenhouse, 11, Upper Brunswick-terrace, Barnsbury-road—Imp. in rendering certain substances less pervious to air and liquids.

57. W. Bradshaw, jun., Coventry—Imp. in watches.

[From Gazette, January 24th, 1862.]

Dated 14th September, 1861.

2298. T. Morris, R. Weare, and E. H. C. Monckton, 4, Trafalgar-square—Imp. in batteries for obtaining electric currents and the products therefrom.

Dated 18th September, 1861.

2324. J. G. Briggs, 23, Earl-street, Blackfriars—An improved method of making fire-proof buildings, ships, and other constructions.

Dated 30th September, 1861.

2431. T. Smith, Aberdeen-street, Sheffield—Imp. in the construction of umbrellas adapted to purposes of self-defence, some of which imps. are also applicable to other purposes.

Dated 23rd October, 1861.

2643. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in processes or means employed for separating or extracting silver from lead. (A com.)

Dated 2nd November, 1861.

2763. T. Spencer, Prescott, and T. Robinson, St. Helen's, Lancashire—Imp. in machinery or apparatus for making pipes and other article of earthenware, and in the form of pipes for gas, sewage, and other purposes. (Partly a com.)

Dated 12th December, 1861.

3113. W. Lightfoot, Harwell, Berkshire—An improved bridle.

Dated 18th December, 1861.

3175. C. E. Symonds, 56, Stone's End, Southwark—Imp. in the treatment and application to various useful purposes of light spirituous liquids.

3177. J. M. H. A. Taurines, Paris—Improved mode of constructing balances, weigh bridges, and other weighing machines.

Dated 19th December, 1861.

3183. E. Stott, Ashton-under-Lyne—Imp. in apparatus used for collecting and removing the waste and dirt which occurs in the process of spinning cotton and other fibrous materials.

Dated 20th December, 1861.

3203. D. C. Le Souef, Twickenham—An imp. in cylinders used in printing calicoes and other textile fabrics. (A com.)

Dated 21st December, 1861.

3207. F. Grimaldi, 13, Manchester-buildings, Parliament-street—Imp. in rotatory steam boilers.

Dated 26th December, 1861.

3229. J. Jones, Liverpool—Imp. in the manufacture of lead, tin, and other metals, or amalgamation of metals of a like nature, fusible at a low temperature into sheets of any thickness or length, and in the apparatus connected therewith.

3231. L. J. Taulin, 4, South-street, Finsbury—An improved wind musical instrument.

Dated 30th December, 1861.

3255. J. Gorton, Park-house, Gateshead, and B. Henderson, South-shore, Gateshead—Imp. in the manufacture of ropes.

Dated 31st December, 1861.

3264. N. McHaffie, 16, Summer-street, Mile-end, Glasgow—Imp. in ventilators or valves for regulating the passage of air or other fluids, whether of a gaseous or liquid form.

3275. R. A. Brooman, 166, Fleet-street—Imp. in revivifying animal black or charcoal, in collecting ammoniacal gases generated in the revivification, in the clarification of saccharine liquors, and in apparatus employed in the revivification of the black, and in the filtering of saccharine liquors. (A com.)

3276. A. Edward and J. Edward, Dundee—Imp. in machinery or apparatus for spinning fibrous materials.

Dated 1st January, 1862.

2. N. C. Szerelmey, 6, Park-terrace, Brixton—Imp. in the manufacture of leather cloth or imitation leather, and in rendering certain fabrics waterproof.

4. T. Hall, Odiham-wharf, Odiham—An improved apparatus for removing weeds from canals, rivers, and lakes, after such weeds have been cut with a chain, scythe, or other machine or implement applicable to that purpose.

Dated 2nd January, 1862.

20. W. A. Fell, Troutbeck-bridge, Windermere—Imp. in the manufacture of bobbins and in the means or apparatus employed therein.

Dated 4th January, 1862.

28. J. W. Arundell, 265, Gresham-house, Old Broad-street—An improved method and improved apparatus for treating and dressing ores and minerals, particularly applicable to tin, lead, copper, zinc, and iron ores. (A com.)

30. J. W. Arundell, 265, Gresham House, Old Broad-street—An improved method of, and apparatus for, communicating motion to fan ventilators, particularly applicable to ventilating mines. (A com.)

32. R. H. Cotter, Cambridge-heath—An improved apparatus for instantaneously lighting certain lamps, and, when desired, extinguishing the same.

Dated 6th January, 1862.

38. J. Coryton, Rolls-chambers, 89, Chancery-lane—An improved type machine.

42. W. T. Kite, Mongewell Mill, Wallingford—Imp. in the manufacture of starch, and in apparatus employed therein.

Dated 8th January, 1862.

52. S. Jesson and J. Batson, jun., Smethwick, J. Moore, jun., Langley, near Oldbury, and J. Roberts, Smethwick—Imp. in the manufacture of gun barrels and wrought-iron tubing.

54. J. Barber, Preston—Imp. in hand mules, consisting of a break and backing-off motion.

56. H. Bessemer, Queen-street-place, New Cannon-street—Imp. in the machinery and apparatus employed in the manufacture of malleable iron and steel.

Dated 9th January, 1862.

60. J. Smith and S. Wellstood, Glasgow—Imp. in cooking stoves or ranges.

62. T. A. Weston, Birmingham—A new or improved multiplying gearing for transmitting and multiplying power, which said gearing may be applied to cranes, windlasses, capstans, and presses, and to other purposes where it is required to transmit and multiply power.

64. H. Charvet, Lille, France—Imp. in the spinning of cotton and in its various applications.

Dated 10th January, 1862.

80. W. Clark, 53, Chancery-lane—Imp. in apparatus for generating and applying steam as a motive power. (A com.)

Dated 11th January, 1862.

82. H. Charlton, Birmingham—Imp. in the manufacture of certain kinds of shoes for mules and horses.

Dated 13th January, 1862.

90. F. C. Warlich, 10, Alma-terrace, New Cross—Imp. in the manufacture of artificial fuel.

92. J. Parker, Ivy-house, Bradford, J. Wells and B. Wells, Bowling, near Bradford—Imp. in steam engines, boilers, furnaces, and apparatus in connection therewith or applicable thereto.

94. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of cups, bowls, saucers, and other dished articles and cases. (A com.)

96. G. Hewitt, Ipswich—Imp. in apparatus used in the manufacture of drain tiles.

100. C. N. May, Devizes—Imp. in the manufacture of pastry, and in apparatus for the same.

Dated 14th January, 1862.

106. W. Gorse, Minworth, Warwickshire—An imp. or imps. in machinery for manufacturing the cut nails called brads.

INVENTION WITH COMPLETE SPECIFICATION FILED.

162. W. Tozer, Gracechurch-street, and A. Read, Walworth—Imp. in boots and shoes.—21st January, 1862.

PATENTS SEALED.

[From Gazette, January 24th, 1862.]

January 24th.		January 24th.
1877. W. Wigfall.		1914. E. J. Muirgridge.
1885. J. Robertson.		1927. G. F. Jones and J. Jones.
1887. G. Sturrock.		1931. J. Henderson and J. Broad-
1890. R. Riley.		ley.
1891. W. Melrose.		1963. E. T. Hughes.
1892. C. C. J. Guffroy.		1988. C. Lee and T. K. Mace.
1893. W. L. Scott.		1991. A. F. B. Falgas.
1897. T. Bradford.		1992. G. H. Birkbeck.
1898. W. H. Ash.		2025. T. Silvester.
1902. J. M. Hart.		2758. B. Brown and R. Hacking.
1906. J. T. Flanders.		2823. A. Turner.
		2831. G. F. Wilson and G. Payne.

[From Gazette, January 28th, 1862.]

January 28th.		January 28th.
1912. H. Shaw.		1973. W. S. Hogg.
1919. R. Benton.		1975. G. H. Bovill.
1926. J. Cross.		1979. H. Kinsey.
1929. G. L. M. Viscount de Pon-		1983. J. Hemingway.
ton d'Amécourt.		2001. A. Garzend.
1933. J. Vavasour.		2002. W. E. Gedge.
1939. H. C. Meyer.		2039. J. Combe.
1941. E. D. Johnson.		2076. G. F. Muntz.
1962. N. A. Lesueur.		2180. W. Fox.
1969. N. D. P. Maillard.		2941. S. Sansum.
		2953. J. Macintosh.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, January 24th, 1862.]

January 20th.		January 21st.
193. J. Childs.		201. D. Moseley.
206. T. W. Rammell.		207. C. Sharps.
249. H. Rawson.		268. C. E. Amos and J. Francis.
252. G. F. Bradbury and J. J.		265. J. Lane.
King.		372. W. E. Newton.
291. M. Loam.		443. H. Y. D. Scott.

[From Gazette, January 28th, 1862.]

January 23rd.		January 24th.
216. J. Fowler, jun., R. Burton,		222. H. Owen.
D. Greig, and J. Head.		236. I. Hammond.
238. D. Graham.		January 25th.
232. J. Kerr.		266. J. MacKenzie.
262. H. Watson.		

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, January 24th, 1862.]

January 20th.		January 25th.
301. G. F. Wilson and G. Payne.		
January 28th.		January 28th.
181. C. W. Tupper.		236. G. Price.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 7, 1862.

INTERNATIONAL EXHIBITION OF
1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £445,000, have been attached to the Deed.

Guarantors holding ivory tickets for visiting the building are informed that those tickets are no longer available.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

Now that the decoration of the building is finally decided, Mr. Crace has commenced the work entrusted to him very energetically. Already the fifty feet courts are showing signs of his exertions. The columns of these courts are coloured a green bronze, with dark red capitals and bases, and a similar dark line runs along the long girders. In the nave great effect will be produced by the scarlet and gold capitals and the gilt ornament of the roof. Each girder will bear at the top the name of some one of the exhibiting countries or their colonies.

The colouring of the machinery annexe has been undertaken by Captain Fowke. The girders will be a warm lavender, while the roof is a yellow stone colour. The effect of this treatment is to give great length to the building.

The northern courts are now entirely roofed in, and wait only for the flooring to be ready for the reception of goods. The plasterers are busy at work upon the upper story of the refreshment arcades, and the cellarage in the eastern portion is in course of construction. The picture galleries are so far advanced that the interior scaffolding has been entirely removed, and a clear view is obtained from one end of the building to the other. The attic story over the central entrance is also completed; the front of this hall will be decorated by Benson's clock, for which space has been left.

Her Majesty's Commissioners are now engaged in directing allotments of space to be forwarded to exhibitors. A plan of each allotment is drawn to scale, showing the passages and allocation of the neighbouring exhibitors, thus at once enabling each one to appreciate and make the most of the

advantages of his situation. These allotments have already been sent out for surgical instruments, class 17, and will be followed very shortly by those for textile fabrics, philosophical instruments, class 13, stationery and printing, class 28, and horology, class 15. In each case, they are first submitted to the Metropolitan Trade Committees for their approval. Sheffield, Birmingham, Wolverhampton, &c., will have distinct courts, in which they can arrange their goods in their own way.

Intelligence has been received of many valuable cargoes from distant settlements now on their way—some of it favourable, some unfavourable. The *Huquenot*, from Ceylon, containing seventeen cases for the Exhibition, has just gone on shore near Boulogne.

Mr. Campbell, the Local Commissioner for Japan, has delivered a general catalogue, which promises an excellent show on the part of that little-known country. The works of industry and art in which the Japanese most excel are of great variety. Many of them will not only bear comparison with the best workmanship of Europe, but in many points they cannot be rivalled. Manchester and Birmingham, London and Paris, will each find in a Japanese collection articles that either cannot be produced in their workshops, or only at a cost that would make them practically unsaleable. Many of these articles, however, with all their delicacy of workmanship and perfection of material, such as the finer kinds of eggshell, porcelain, and china; the inlaid, enamelled, and chiselled metal work; the crape silk fabrics, and the lacquered ware, are procurable in Japan, especially by the native purchasers, at very moderate prices. Others again are very costly, and can only be obtained at prices which in Europe would probably be thought far beyond their value. These are chiefly specimens of old lacquer, old bronzes—the finer kinds of ivory carving, swords, and armour, of which latter class the armed retainers of the Daimios, and the feudal chiefs themselves are extravagant admirers and collectors. When wealthy they will give any price for an approved weapon by a maker of great repute.

As the object of this Japanese collection is to exhibit, as far as limits of space and means will allow, a fair sample of the Japanese, and their capabilities of production in rivalry with the nations of the West, all the articles selected will be found to throw some light on this question of competitive power of production, as well as on the progress in civilisation of a people who have been nearly wholly unaided by contact with the European race.

The various objects are thus classified:—

SPECIMENS OF LACQUER-WARE.—Lacquering on wood; lacquer and inlaid woods mixed; lacquer on other materials, shells, ivory, tortoise-shell, &c.

SPECIMENS OF STRAW-BASKET WORK, and lacquer, and

lacquer combined in articles of use and ornament; basket and rattan work.

SPECIMENS OF CHINA AND PORCELAIN of every variety, enamelled, lacquered, and plain; also of pottery, and quaint forms of earthenware.

SPECIMENS OF METALLURGY AND MINERAL PRODUCTS.—Bronzes, simple and inlaid with other metals; medallions and intaglios in pure and mixed metals; brooches, medals, buttons, &c.; cutlery and workmen's tools; arms and armour.

MANUFACTURES OF PAPER.—Raw materials; paper for rooms, for writing, for handkerchiefs, for waterproof coats, &c.; imitation leather.

TEXTILE FABRICS.—Silk crapes, silks, tapestry; printed cottons; fabrics from the bark of a creeper.

WORKS OF ART.—Carvings in ivory, wood, paintings, illustrated works, lithochrome prints, &c.

EDUCATIONAL WORKS AND APPLIANCES.—Books of science, scientific models and instruments (chiefly copied from the Dutch), Japanese shells, toys, &c.

There will also be a miscellaneous collection of specimens of lacquer-ware, lacquering on wood, inlaid wood and laquer mixed.

LACQUER ON THE MATERIALS, as ivory, shells and tortoise-shell, &c.; and inlaid woods.

The articles will number more than 600, the bulk of which have been gathered together by Mr. R. Alcock, C.B., her Majesty's Minister at the Court of the Tycoon.

ROAD CONNECTING THE DISTRICTS NORTH AND SOUTH OF HYDE-PARK AND KENSINGTON-GARDENS.

The Council of the Society of Arts, in consequence of the interest which the Society has in the permanent building for International Exhibitions at South Kensington, recently appointed a Committee to consider the best means of obtaining some road for connecting the districts north and south of Hyde-park, having particularly in view the opening of such road during the Exhibition of 1862. The Committee has reported that:—

“The First Commissioner of Public Works, on the part of the Crown, after considering the various projects that have been made to him for connecting the districts north and south of Hyde-park and Kensington-gardens, has authorised the making of a road which will take the following course:—On the north side the road will begin in the Bayswater-road, slightly to the west of Victoria-gate; it will proceed along the ha-ha or ditch which separates Kensington-gardens from Hyde-park; it will then cross the Serpentine-bridge on a level, and pass through one tunnel, so as not to interfere with Rotten-row, and through a second tunnel whereby the carriage road parallel with the Kensington-road is left untouched. Excepting, therefore, on the Serpentine-bridge, the road throughout will be sunken, and cause no interference whatever with the present public enjoyment of Kensington Gardens and Hyde Park. Should the Metropolitan Board of Works assent to making this road, there would be no occasion to apply to Parliament for any powers; but if, on the contrary, the Metropolitan Board should decline, then it will be necessary to obtain Parliamentary sanction to levy tolls and raise debentures on the security of them.

“It is proposed that such debentures shall bear 5 per cent. interest, and shall give to each proprietor a transferable free pass for each debenture, not exceeding five. The tolls are to be redeemable when the capital has been

paid off, and the repair of the road will be charged on the tolls.

“In the first instance the capital to be raised will be £35,000; but, to provide for any alterations on the Serpentine-bridge, should it be necessary, powers will be sought slightly to increase it.

“It is proposed that trustees shall be created for the administration of the funds; that such trustees shall consist of representatives of the Exhibition of 1851 and of the Exhibition of 1862, the chairman of the Council of the Society of Arts for the time being, and some other representatives of local interests.”

If the Metropolitan Board of Works decline to make the road there, then the only alternative of having a road will be to make it upon the voluntary principle. Donations in aid will be received, but it is chiefly by means of a toll to be paid by those who find it convenient to use the road that the cost and maintenance of it can be defrayed.

Among the parties who have expressed a desire to take debentures are the Earl Granville, K.G., Commissioner for the Exhibitions of 1851 and 1862; the Earl of Shelburne, Sir Wentworth Dilke, Bart., Commissioner for the Exhibitions of 1851 and 1862; Thomas Baring, Esq., M.P., Commissioner for the Exhibitions of 1851 and 1862; Thomas Fairbairn, Esq., Commissioner for the Exhibition of 1862; the Directors of the Great Western Railway; J. G. Frith, Esq., &c.

Plans and surveys of the roads and levels have been made by Mr. J. Fowler, C.E., by the direction of the first Commissioner of Public Works, who will forthwith apply to Parliament for the necessary powers to levy tolls.

Persons desirous of obtaining debentures issued by sanction of Parliament, or making donations in aid of the road, are requested to apply to P. Le Neve Foster, Esq., Secretary of the Society of Arts, John-street, Adelphi.

FORM OF APPLICATION.

To P. LE NEVE FOSTER, ESQ., SOCIETY OF ARTS.

Please to register my application for _____
 Debentures of £100 each, to be issued _____
 according to Act of Parliament, on the Security of the
 Tolls to be taken for making a Road to connect the Dis-
 tricts North and South of Hyde-park; and I agree to
 accept the same, or any less number which may be
 allotted to me.

 Name.

 Address.

 day of

or

Please to enter my name as a Donor of _____
 towards making the road, &c.

 Name.

 Address.

EIGHTH ORDINARY MEETING.

WEDNESDAY, FEB. 5TH, 1862.

The Eighth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 5th inst., Dr. A. W. Miller, F.R.S., Professor of Chemistry, King's College, London, in the chair.

The following candidates were proposed for election as members of the Society:—

Bally, Otto	{ Messrs. Arles Dufour & Co., 41, Threadneedle-st., E.C.
Cameron, Capt. W. Ogilvie.	{ Langbourne - chambers, 16½, Fenchurch-street, E.C.
Cave, Rev. Thos. Wells... ..	53A, City-rd., Finsbury, E.C.
Dowson, Joseph E.	{ 38, Dowgate-hill, Cannon- street, E.C.
Groombridge, Henry.....	5, Paternoster-row, E.C.
Groombridge, Richard ...	5, Paternoster-row, E.C.
Hodgkinson, S.	43, Threadneedle-street, E.C.
Hooper, B.	43, King William-st., E.C.
Judson, Henry	10, Scott's-yard, Bush-la., E.C.
Killy, C. O.	52, Bread-st., Cheapside, E.C.
Lambert, Henry T.	74, Grosvenor-street, W.
Mavor, William.....	77A, Park-st., Grosvenor-sq. W.
Meeson, Richard	{ Duvals, Gray's, Essex, and 8, George-yard, Lombard-st., E.C.
Mourant, Edward	Samarès Manor, Jersey.
Noble, George	{ 4, George-yard, Lombard-st., E.C.
Noble, Joseph Alfred ...	{ 4, George-yard, Lombard-st., E.C.
Poulton, J. Fox	153, Cheapside, E.C.
Worth, Charles Jones ...	{ City Band, Treadneedle-st., street, E.C.

The following candidates were balloted for and duly elected members of the Society:—

Bentley, Robert J.	Finningley-park, Bawtry.
Brinton, John.....	Kidderminster.
Champion, Percival	Stamford-hill, N.
Countze, George	103, Long-acre, W.C.
Crisp, W. B.	81, St. John-street-road, E.C.
Evans, Anthony.....	34, Bloomsbury-square, W.C.
Hooper, J. K.	20 and 21, Queenhithe, E.C.
Lahee, Samuel	17, Brompton-square, S.W.
Lendy, Captain A.	{ Practical Military College, Sunbury, S.W.
Massey, Thomas.....	5, Gray's-inn-square, W.C.
Sim, William.....	1, Dane's-inn, Strand, W.C.
Spencer, Thomas	{ Newburn Steel Works, 5, Westgate-street, Newcastle- on-Tyne.
Wurtzburg, Edward	May-villa, Leeds.

The Secretary called attention to some electrotype copies of Pistrucci's great Waterloo Medal, placed on the table for the inspection of the members by Mr. W. Johnson.

It has been determined to multiply copies of this medal by means of the electrotype, and for this purpose the Lords Commissioners of Her Majesty's Treasury have authorised the Master of the Mint to place the matrixes in the hands of Mr. Johnson, who will at once proceed to execute such numbers as may be subscribed for by the public.

The Paper read was—

ON IMPROVEMENTS AND PROGRESS IN DYE-ING AND CALICO PRINTING SINCE 1851.

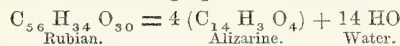
BY DR. F. CRACE CALVERT, F.R.S.

I cannot presume to give, in a paper like the present, an account of all the improvements and inventions which must have occurred in such extensive trades as those of dyeing and calico printing during a space of ten years, and especially during a decade of extraordinary progress like that which has just passed. The utmost, therefore, that I can do is, to lay before you an outline of the principal discoveries which have come to my knowledge during the period under consideration.

I wish, however, to state that the processes of which I shall speak to-night are those generally known to calico-printers; for it will be easily understood that many printers may use methods peculiarly their own, and that it would be a breach of confidence were I to publish any such processes that may have been communicated to me.

I shall divide the subject into two heads. First, treating of new dyeing materials obtained from well-known dyestuffs, and then of dyestuffs altogether new, together with their application to dyeing. Secondly, I shall consider the subject of calico printing.

Madder.—This valuable dyestuff, which is chiefly imported from France, Turkey, Italy, and Holland, is obtained from the *Rubia Tinctorum*. Our chemical knowledge of the composition of this root, so important to dyers and calico printers, was, up to 1851, in a most unsatisfactory state. Thus, whilst we find that MM. Decaisne, Jean Gerber, Edmund Dollfus, &c., asserted only one colouring principle, to which they gave the names of *alizarine*, *colorine*, or *azale*, others, such as M.M. Persoz, Runge, &c., admitted two colouring principles, *alizarine* and *purpurine*, and Kuhlmann added to these two, a third, called *xanthine*. But Dr. Edward Schunck, F.R.S., published, in 1851, his most valuable and extensive researches on the chemical composition of madder, which not only threw much light on the colour-giving principle of the rubia root, but also, as I will presently show, led to valuable commercial applications. He ascertained that, although the roots contained a certain quantity of colouring matter called *alizarine*, yet that the ultimate source of this only colour-giving principle was a substance to which he gave the name of *rubian*. He further found that one equivalent of this substance under the influence of a ferment called *erythrozym*, or of acids, or alkalies, would, by losing 14 equivalents of water, be converted into 4 equivalents of *alizarine*, as the following equation shows:—



This result satisfactorily explained the change of madder into garancine by the action of sulphuric acid on that root, from the fact that rubian was susceptible of conversion, under the same influences, not only into *alizarine*, but also into two valueless substances, called *rubiretine* and *verantine*. This led Dr. Schunck, in conjunction with Mr. Simon Pincoff, in 1852, to the production of a most important dyeing material, called by them *commercial alizarine*. But to enable you to understand in what this product differs from garancine, and also its mode of preparation, it is necessary that I should state that the *verantine* and *rubiretine* are not colour-giving principles, and that they interfere with the beauty and brightness of the fine shades of purple given by *alizarine*, which, according to Dr. Schunck, is the only colour-giving principle contained in madder.*

Garancine, which, even before 1851, was extensively used for producing red, purple, and chocolate upon calico, was obtained, as you are aware, either by mixing together at an ordinary temperature equal weights of madder and sulphuric acid, then adding water, when the garancine was

* Dr. Schunck also obtained as products of decomposition of rubian, rubianine and sugar. Those who are interested in these chemical researches will find them fully detailed in the Transactions of the Royal Society.

produced, requiring only to be thoroughly washed so as to remove the acid;—or by mixing the roots with one-third their weight of sulphuric acid previously diluted with water, and carrying the whole to the boil for one or two hours, washing the residue repeatedly, and using, in the last operation, some alkaline carbonate. Although garancine thus prepared gave colours similar to madder, yet they were wanting in solidity. This effect, especially as regards purples, was overcome by Messrs. Pincoff and Schunck by taking principally garancine prepared as above, but thoroughly depriving it of acid, and submitting it to the action of high pressure steam, when the substance called verantine is decomposed or modified so as not to interfere with the purple dyeing power of alizarine. The advantages possessed by this product, which is now so extensively employed in calico printing, that several millions of pieces have been dyed with it, are, as stated by Messrs. Pincoff and Schunck, as follows:—It produces good lilacs economically and without soaping; great promptitude and regularity in the production; facility of producing combination of lilacs with catechu, lilac and chocolate, and lilac and orange, which results cannot be obtained so satisfactorily with madder or garancine; production of lilac shades graduated *ad libitum*. Lastly, economy of mordants. I shall again refer to this in speaking of calico printing.

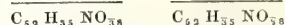
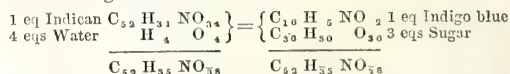
Whilst on this class of madder products, I may refer to an improvement effected by Mr. John Lightfoot, in the manufacture of garanceux, (which was discovered in 1843 by Mr. Schwartz), or spent madder, which has been treated with sulphuric acid, as above described, for the preparation of garancine. The method now generally followed is to collect the spent madder in bags as it runs from the dyebecks, and then throwing it on to a heap, to be ultimately converted into garanceux, by acting upon it as above described, with sulphuric acid. Mr. Lightfoot, however, recommends large vats to be provided, allowing to run into them the hot spent madder liquors of the dyebecks, together with vitriol, leaving the whole to stand for 24 hours, running off the clear liquor and washing the solid garanceux thus produced, until all impurities and acid are removed. The advantages claimed are, first, saving of fuel, by economising the heat of the waste liquors, and secondly, the production of one-fourth more colouring matter. Of late years the French calico printers have applied, for light styles of madder-pinks, extracts of madder, or garancine, which have generally been obtained by treating madders or garancines with alcohol or wood-spirit, and adding to them acetate of alumina and acetic acid; a similar process has recently been patented by Mr. F. A. Gatty. Another most interesting process has recently been published by Mr. Emile Kopp, for the production of alizarine from garancine. It consists in submitting dry garancine in a double cylinder to the action of superheated and saturated steam, when the alizarine is carried off by the steam, and the whole condensed in a refrigerator.

Flower of Madder.—This product, which is now extensively used by continental printers, and which was introduced to the trade by MM. Julian and Roquer towards the beginning of 1852, is prepared by allowing madder to ferment, and then washing it thoroughly, which removes from it, not only all soluble matters such as sugar, mucilaginous substances, acids, &c., which interfere with the fixation of the alizarine on the various mordants, but also (in accordance with Dr. Schunck's researches on the influence of the ferment erythrozym on rubian), increases the quantity of colour-giving principle or alizarine. It is found, by experience, that 100 parts of flower of madder are equal to about 200 parts of ordinary ground roots, and that the shades are finer, the pinks and reds also having greater solidity. Mr. E. Mucklow has recently patented a process similar to the above, which consists in alternately macerating and pressing madder roots so as to expel from them various materials which, as above stated, interfere with the dyeing of the fabrics.

Mr. Emile Kopp has published a very interesting paper on the subject of madder, in which he proves that, if the madders of Alsace are treated with a weak solution of sulphurous acid, and to this solution, which has a fine golden colour, he adds three or four per cent. of hydrochloric acid, and heats the whole to a temperature of 150°, a red colouring matter is precipitated, which he states to be pure *purpurine*. If, after the separation of this precipitate, the liquor is again carried to the boil, a new colouring matter is formed, which he calls *green alizarine*, and finds to be composed of pure alizarine and a dark green resin, which he considers is produced by the decomposition of chlorogenine.

As a *resumé* of my observations on madder, I may state that the only two madder products which have received extensive application since 1851 are commercial alizarine and flower of madder.

Indigo.—I have the pleasure again to draw your attention to a series of researches by Dr. Edward Schunck, and to enable you to appreciate the value of his discoveries in connexion with this important dyestuff, it is necessary that I should first state that chemists held two different opinions as to the condition in which the colouring matter existed in the indigo plants. Thus, Chevreul, Girardin, &c., considered that the indigo contained in the plant was in the form of white, or de-oxygenated blue indigo; whilst Giobert and others believed that it did not pre-exist in the vegetable, but was formed during the process of fermentation, which is usually employed for the extraction of the colour from the *Isatis tinctoria* and *Indigofera anil*. Serious doubts having arisen in the mind of Dr. Schunck, whether either of these theories correctly explained the state in which indigo existed in the indigo plant, he undertook a long series of researches, by which he was enabled to show, with a positive certainty, that the *Isatis tinctoria* contains a substance easily soluble in hot and cold water, alcohol, and ether, and which, by the action of strong mineral acid, yields indigo blue. Further that the formation of the colouring matter from it can be effected without the intervention of oxygen or of alkalies, and that the latter, indeed, if allowed to act upon it before the application of acid, entirely prevents the formation of the colouring matter; viz., indigo blue. To ascertain whether the substance which he calls *indican*, pre-existed in the plant, Dr. Schunck operated as follows:—He digested in ether some perfectly dry leaves of the *Isatis tinctoria*, removed the ethereal solution, and having exposed it to spontaneous evaporation, it left a green syrupy residue, from which water extracted *indican*, for by the action of boiling sulphuric acid, it yielded an abundance of indigo blue. To obtain the *indican* in a high state of purity, he found it necessary to treat the leaves with alcohol and ether, and to submit the extract to various chemical operations, to get rid of all impurities, so as to obtain *indican* as a yellow transparent glutinous substance, of a slightly bitter and nauseous taste. This substance presents the remarkable property (similar to that of rubian in madder) of being susceptible under the influence of a ferment in the plant, or of acids, of yielding indigo blue and sugar, as seen by the following chemical formula:—



To obtain this interesting decomposition with acids, it is simply necessary to heat the *indican* with strong sulphuric or hydrochloric acid, when the indigo blue precipitates while the sugar remains in solution. But *indican* is so liable to undergo modifications, that if the action of the acids be continued, besides the indigo blue an indigo purple is formed, called by Dr. Schunck *indirubine*. To fully appreciate the value of these researches it is necessary that I should lay before you an outline of the manufacture of indigo, as some of you may not be acquainted with it. Commercial indigo is obtained from plants belonging to the leguminous tribe, known under the general name of *indigofera*, that

these plants are mowed and placed in large vats with water, and allowed to ferment for 8 or 10 hours, when the supernatant liquor first becomes green and then blue. It is then run off into other vats and well agitated, so as to bring it thoroughly under the action of the atmospheric oxygen, when the white soluble indigo becomes thoroughly oxydised into blue insoluble indigo. A little lime water is now added and the whole left to settle, the deposit collected on a cloth, drained, pressed, divided into square lumps, and dried in the sun, when it constitutes commercial indigo. Dr. Schunck's researches show, as above stated, that under the influence of a ferment the *indican* is converted into sugar and white indigo; and they also explain that if the manufacturer is not extremely careful he may experience great loss in the amount of indigo obtained, for Dr. Schunck has observed that *indican*, when dissolved in water, is liable to undergo rapid modifications, and that instead of yielding by the acids indigo blue and *indirubine*, it gives *indirétine*, *indihumine*, &c. You will, doubtless, be struck, with the great similarity which exists between the colour-giving principles of the madder and indigo plants, and with the light thrown upon this class of tinctorial matters by the laborious researches of Dr. Schunck. I cannot leave this interesting substance without stating that, although one or two attempts have been made to introduce new preparations of indigo, they have not, to my knowledge, yet received the sanction of the trade. Such are the preparations of the sulpho-indigotic acid of Mr. Haefly, the sulpho-purpurate of soda of Mr. Bolley, and the indigo of Mr. Johnson.

Orchil.—It is hardly necessary for me to state that this dyestuff has been used for producing violets, mauves, reds, and other colours for many years, and that the colouring matter was obtained by allowing lichens to remain in contact at natural temperature for several weeks with putrid urine and a little lime, and that of late years ammonia has been substituted for urine, with the addition of a little carbonate of soda, nitrate of soda, or alum. You are also doubtless aware that Robiquet was the first to obtain a colourless principle called *orceine*, and to show that under the influence of oxygen and ammonia it became transformed into water and a red colour called *orceine*, and that Dr. Schunck proved that a substance extracted by him under the name of *lecanoric acid*, from lichens, would, under the influence of heat and a solution of baryta, decompose itself into water, carbonic acid, and *orceine*. Without overlooking the interesting researches of Heeren and Sir Robert Kane on this subject, I must especially mention the labours and valuable researches of Dr. Stenhouse, which not only added greatly to our knowledge of the various chemical principles existing in lichens from which the orchil colouring matters are obtained, but also led him to discover a commercial method of extracting from the lichens the various organic substances capable of giving orchil colours when placed in favourable conditions. He also showed that the very small per-centage of colouring matters in proportion to the bulk of weed might be cheaply and commercially extracted in the locality where the lichens grow, thus saving the enormous expense of carrying a large bulk of useless matter from Africa and elsewhere to this country. If this valuable hint of Dr. Stenhouse's has not yet been acted upon as regards the saving of transport, his process for extracting the colour-giving principle has of late years been extensively adopted by manufacturers of orchil, enabling them to obtain cheaper and better colours from lichens. But still none of these advantages led manufacturers to the great desideratum of giving fastness to the beautiful purple shades obtained from orchils until 1856, when Mr. Marnas, of the firm of Guinon, Marnas, and Bonnet, of Lyons, found that by treating lichens, as suggested by Dr. Stenhouse, with milk of lime, filtering the lime liquor off and precipitating the colour-giving principle from it with hydrochloric acid, gathering these on a filter, and after having properly washed them, dissolving them in caustic ammonia, and

keeping this ammoniacal liquor at a temperature of 153° to 160° for 20 to 25 days, when under the influence of that temperature, the colour-giving principles of the lichens fix ammonia and oxygen and are transformed into a new series of products, which Mr. Marnas separates from the coloured liquor by adding chloride of calcium, which causes a fine purple lake to be deposited, which, after being well washed and dried, is sold under the name of *French purple*. It is easy to understand that the chloride of calcium can be replaced by salts of alumina, tin, &c. What characterises this orchil colour from those previously known is, that it dyes animal fibres with greater facility than the common orchil, that it gives directly mauve colours, which can be modified by adding to them a little carmine of indigo, roseine, &c.; but the essential difference of these purples and mauves from ordinary orchil colours is—that while the latter are destroyed by acids and light, those of Mr. Marnas, on the contrary, withstand their action, thus accounting for the public favour given to Messrs. Guinon, Marnas, and Co.'s orchil colours. To dye silk or wool with French purple it is simply necessary to mix the lake with its weight of oxalic acid, boil with water and then filter, the oxalate of lime remaining on the filter while the colour passes in the filtrate. This liquor is then added to a slightly ammoniacal liquid contained in the dye-beck; all that is now necessary is to dip in the beck, silk, wool, cotton, mordanted with albumen, or cotton prepared for Turkey red, when any of these materials will become dyed with magnificent fast shades of purple or mauve. It is a curious coincidence that after many years of anxious search, two purples from widely different sources should have been first discovered in the same year (1856) in different countries. I allude to Mr. Perkin's purple from coal tar, to which I shall refer further on.

Catechu, or *Terra Japonica*, which is extracted from the wood of the *acacia catechu*, and which we import in large quantities from the East Indies, is daily becoming of increased importance, owing to the great variety of colours that can be obtained with it. It contains two very distinct substances, a tannin (studied by Dr. Stenhouse) which gives a green precipitate with salts of per-oxide of iron, and also a substance called *catechine*, which under the influence of alkalies and oxygen is rapidly transformed into two acids called japonic and rabinic acid. As in catechu, the tannin gives various shades of drab, the catechine giving, with proper metallic salts, salmon, red, and wood colours. Some calico printers have of late, under my advice, washed with cold water pulverised catechu, which dissolves freely the tannin, leaving the catechine insoluble in cold water, which, however, being soluble in hot water, becomes susceptible of application.

Aloes.—Owing to the interesting researches of Drs. Schunck and Stenhouse upon the resin obtained from the *aloe socotorina*, and imported from the East and West Indies as well as Africa, the various colouring matters obtained by them have, of late, been employed by the French dyers for producing pinks, violet, maroons, and other shades.

Lac Dye.—Messrs. Haworth and Brooke, of Manchester, have introduced into commerce a lac dye superior to that imported from India, which, as you are aware, is prepared from stick lac. Their improvement consists in treating stick lac with weak ammonia, and adding to this solution chloride of tin, when a fine red insoluble matter is formed which precipitates. This is collected, and is ready for use.

Chlorophyll.—For many years attempts were made to fix upon fabrics the green colouring matter of leaves, but unsuccessfully, until, in 1854, MM. Hartmann and Cordillott, of Mulhouse, succeeded by the following simple process in obtaining on silk, wool, and cotton, fine green brilliant and solid colours. After having boiled a quantity of grass, so as to remove everything soluble in boiling water, it was heated with a hot caustic lye of specific gravity 1.03, this alkaline solution being then neutralized with hydrochloric acid, a fine green precipitate was

thrown down. This precipitate was then dissolved in a solution of caustic lye, to which had been previously added some phosphate of soda and oxide of tin. This mixture, properly thickened with gum, was printed and fixed by steaming. No doubt, by a slight modification in the *modus operandi*, this colour might be applied to dyeing.*

Chinese Green, called *Lo-kao*.—In 1851 and 1852, public attention was drawn, by several English gentlemen, to samples of a green colouring matter, imported from China, and in 1853, Messrs. Guinon, of Lyons, imported such quantities of the material as to enable them to dye silks for the requirements of the trade. The silks so dyed by them, under the names of *Vert-Venus*, *Vert-Azof*, and *Vert-Lumière*, were especially admired, from the beautiful green shades they assumed in artificial light; and although the price of the dye fell from £21 per pound in 1853, to £4 in 1860, these beautiful shades of green (especially under artificial light) have almost disappeared from the market, owing to the two following reasons:—first, their want of stability; and, secondly, because Messrs. Guinon, Marnas, and Bonnet, have found the following means of producing, at less cost, shades of green which also maintain this character under the influence of artificial light, *i.e.* by first dyeing their silks in Prussian-blue, and then dyeing them in an acidulated bath of carboazotic, or picric acid. It is an interesting fact to observe that, while the greens produced with indigo and picric acid appear blue in artificial light, those produced as above with Prussian blue and picric acid appear green under the same conditions. I cannot leave this interesting subject without making two further remarks:—First, *Lo-kao* is the only substance with which I am acquainted capable, with proper reagents, of producing the seven colours of the spectrum; secondly, that, thanks to the advanced state of chemical and botanical science, we have succeeded in producing, in Europe, the identical substance imported only a few years ago, as a great novelty, from China—and for which, but for those sciences, we should still probably have remained tributary to that empire. Thus Mr. Charvin, of Lyons, has been able to obtain *Lo-kao* from a weed indigenous to Europe, *viz.*, *Rhamnus catharticus*, for which he has received, from the Chamber of Commerce of Lyons, a gold medal worth 6,000 francs.†

Murexide, or *Roman Purple*.—The colour to which I am now about to draw your attention furnishes another example of the assistance which the progress of chemical science has rendered to the art of calico printing. In 1776, the illustrious Swedish chemist, Scheele, discovered, in human urine, uric acid. In 1817, Brugnatelli found that nitric acid transformed uric acid into a substance, which he called *erythric acid*, but which was subsequently called, by Wöhler and Liebig, *alloxan*. In 1818, Dr. Prout found that the latter substance gave, when in contact with ammonia, a beautiful purple red colour, which he called *purpure of ammonia*—the product known by the name of *murexide* since the researches of Liebig and Wöhler, published about 1837. These discoveries remained dormant in the field of pure science until the year 1851, when Dr. Saac observed that when alloxan came in contact with the hand it tinged it red. This led him to infer that alloxan might be employed to dye woollens red, and further experiments convinced him that if woollen cloth were prepared with a salt of tin, passed through a solution of alloxan, and then submitted to a gentle heat, a most beautiful and delicate pink colour resulted. In 1856, MM. Depouilly, Lauth, Meister, Petersen, and Albert Schlumberger, applied it as a dyeing material to silk and

wool, and succeeded in obtaining red and purple colours, by mixing the murexide with corrosive sublimate, acetate of soda, and acetic acid. For printing, a mixture of murexide with nitrate of lead or acetate of zinc, properly thickened, is applied on cotton fabrics, which are then allowed to dry for a day or two, when the colour is fixed by passing them through a mixture of corrosive sublimate, acetate of soda, and acetic acid. The Roman purple style of printing has been carried out extensively by Messrs. Edmund Potter and Co.; Boyd, Sons, and Hamel; and James Black and Co. No doubt you will wonder whence such quantities of uric acid, or murexide, could be drawn to supply a demand like that which has arisen. This result has been achieved by the following process of extracting uric acid from Peruvian guano. Guano is treated repeatedly with hydrochloric acid, until all soluble matters are removed by heat and washing. The insoluble mass, which consists chiefly of sand and uric acid, is carefully treated with nitric acid of specific gravity of 1.40. When the action of the acid is completed, the mass is treated with warm water, and thrown on a filter. The filtrate, which has a yellowish colour, and contains alloxan, &c., is evaporated carefully to such a degree, that when left to cool it becomes a brownish red or violet solid, called by the inventor, *carmin de pourpre*, which is the substance chiefly used for printing, as above described. It is to the enterprising commercial spirit of Mr. Robert Rumney, chemical manufacturer, of Manchester, that is due the extensive production and application of murexide in this country.

Doubtless you are aware that alum, and cream of tartar, are used largely as mordants in the dyeing of silk, wool, and cotton, and that the latter substance has much risen in price, owing to the failure of the wine crops of late years; therefore, any process for economising the use of cream of tartar is a matter of importance. I am happy to state that Mr. Kuhlmann has, within the last few weeks, published in the *Mémoires of the French Academy*, a paper in which he furnishes a means of attaining that end. Having first confirmed a most important observation of Mr. Chevreul's, *viz.*, that when cream of tartar is used as a mordant it is decomposed into tartaric acid, which adheres to the fibre, and into a neutral tartrate which remains in solution and is lost, and that if, on the contrary, instead of using the cream of tartar as a mordant, it is first decomposed into tartrate of baryta, and that this salt be used as a mordant, in connexion with a little hydrochloric acid, the two equivalents of the tartaric acid of the cream of tartar become available, and consequently a saving of one-half the quantity of cream of tartar formerly used is effected.

In the hope that it may prove interesting to the members of this Society, I will now give some details respecting a few new processes for dyeing silk, before proceeding to treat of coal-tar colours.

Catechu Black.—The silks are first passed into a solution of salts of peroxide of iron, then into a hot soap solution containing an excess of soap, from whence they are passed into a slightly acid bath of prussiate of potash. The silks which have thus been dyed Prussian blue, are dipped in a solution of persalt of iron, having a specific gravity of 1.15, the object of which is to give an iron mordant to the silk. They are then thoroughly washed and passed into a bath of catechu for orgazine at 203°, and for tram at 172°, the silks being worked in this bath until it is cold, so as to saturate thoroughly the iron mordant with the colouring principle of catechu, and thus produce a black. They are then wrung on the peg and exposed to the atmosphere for 24 hours, after which they are passed into a soap solution at 150°, washed thoroughly, and the orgazine is then dipped in a bath of weak acetic acid, and the tram in one of weak hydrochloric acid; finally, the silks are passed through an emulsion of oil, well worked on the peg and allowed to dry. These last operations are intended to remove, by means of the fatty matters, the harshness which the silk would otherwise possess.

* Any one who wishes for further information on the green colouring matter from plants, will find a most interesting paper by M. Fremy, published in the *Comptes Rendus of the French Academy*, for 1860, volume 50, in which that chemist shows that chlorophyll is composed of two colouring matters called phylloxanthine and phylloxyaniline.

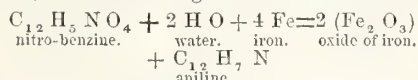
† For full details on this subject, see Report presented to the Chamber of Commerce, at Lyons, by the Rev. M. Hélot, M. Persoz, &c.

The following is a process for preparing dyed silks, so that when woven into fabrics these will be fit for taking the moiré antique:—Two parts of pure olive oil are mixed with one of concentrated sulphuric acid, and agitated until sulphurous acid begins to be liberated. It is then well mixed with 15 parts of lukewarm water, and the whole further diluted with boiling water. The silks are then passed into this bath and then into a second similar bath, to which has been added a little free vitriol. After this, they are successively dipped in a hot bath containing a little citric acid, then into the previous No. 2, to which is added a little sulphate of alumina and a little black dye to restore to the silk any colour it may have lost during the former operations. The silks, after having been dried in the air, are ready for weaving. The object of these processes is to introduce into the silk fatty acids, the property of which is to communicate to the silk a great degree of softness, and adapt it to receive, by intense pressure, the intended moiré.

I will now describe a process for dyeing silks white. The silks, after having been boiled, are first passed into a slightly ammoniacal bath, and from thence into another of water, in which has been dissolved a little French purple, and lastly, into another bath containing lukewarm water, to which is added, in successive portions, some carmine of indigo, and the silks are then dried. Many of you will doubtless remember that in my papers read here in 1851, I explained that, when the three primitive colours of the spectrum are mixed in due proportions, they produce white if reflected, and black if absorbed. The French purple gives the red; the carmine of indigo, blue; and the silk itself the required yellow.

Several improvements have also taken place in the production of maroons, greens, and Prussian blues, but time will not allow of my laying the details before you.

Colours derived from Coal Tar.—These colours are as interesting for their beauty and brilliancy as for the source from whence they are derived, and present a remarkable instance of the valuable services which abstract science so frequently renders to the material interests of society. How little did even chemists dream that a substance first perceived by Unverdorben in the year 1826, then named *aniline* by Fritzsche, and discovered in coal tar about 1841, by Dr. A. W. Hofmann, would lead to the production of such magnificent colours as aniline purple, magenta, &c. There can be no doubt that it is to the interesting and learned researches of Dr. Hofmann on aniline, that we owe the possession of these splendid colours, and further, it was one of his pupils, Mr. W. A. Perkin, who produced for the first time, on a commercial scale, aniline, and then the splendid purple colour which it is susceptible of yielding. Before describing to you the process patented by Mr. Perkin in 1856 to produce his purple, allow me to lay before you an outline of the present plan followed for obtaining aniline. A carburetted hydrogen, which I mentioned to you in one of my previous papers, called "Benzine" ($C_{12}H_6$), and obtained by the careful distillation of purified coal naphtha at a temperature of about 186° , is treated with strong nitric acid, when a violent action ensues, which gives rise to nitrobenzene or $C_{12}H_5NO_3$. To convert this compound into aniline, one hundred parts of nitro-benzine are mixed with an equal quantity of acetic acid, and 200 parts iron filings, heat is produced, and the following chemical action ensues:—



The whole is then introduced into a retort, and the raw product which passes from it is mixed with a little alkali or lime, and again distilled, when aniline is obtained. This important substance is, as you perceive, a colourless fluid, which boils at 359° , has a decided alkaline reaction, and a sp. gr. of 1.028. The following is the process described by Mr. Perkin for preparing his purple. Solutions containing equivalent proportions of sulphate of aniline and bichromate of potash are mixed and allowed to stand till the re-

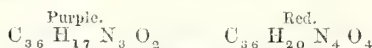
action is complete. The resulting black precipitate is then thrown on to a filter and washed with water until free from sulphate of potash; it is then dried. This dried product is afterwards digested several times with coal tar naphtha until all resinous matter is separated, and the naphtha is no longer coloured brown. After this it is repeatedly boiled with alcohol to extract the colouring matter. This alcoholic solution when distilled leaves the colouring matter at the bottom of the retort as a beautiful bronze coloured substance, which may be considered as Mr. Perkin's commercial aniline purple. This colour, which can also be produced by oxidising aniline by other metallic salts, is slightly soluble in water, freely soluble in alcohol, and presents the remarkable property of not being affected by light, alkalies, or acids. To dye wool or silk with it, it is simply necessary to add to a hot water bath, slightly acidulated with tartaric acid, some of the alcoholic solution of aniline purple, and to work the silk in the said bath, wringing and washing it; the purple shade thus produced can be modified with roseine, Prussian blue, or sulphate of indigo. To dye cotton so as to resist the action of soap and light, the process is modified so as to form on the cotton fibre an insoluble compound of colouring matter with tannin and a metallic base. To effect this the cotton is passed for an hour or two into a bath containing a tanning substance, and then into a weak solution of stannate of soda, wrung out, passed into an acid liquor, rinsed in water, and then, like silk, dipped into an acidulated bath of purple aniline. Also cotton prepared with a basic salt of lead, or as for Turkey red, will take up aniline purple. On the 12th January 1861, another interesting process to obtain aniline purple was patented by Mr. Adam Girard. Pure red aniline (known in this country as magenta), is mixed with an equal weight of aniline, and the mixture heated for several hours to 329° , when the mass is changed to a fine purple colour, requiring only to be mixed with water and hydrochloric acid, to remove any aniline or red dye in excess, leaving the purple insoluble, but on being well washed with water, this becomes soluble in alcohol, acetic acid, wood naphtha, and boiling water slightly acidulated with acetic acid.

Whilst on this mode of producing purple aniline, I may say that blue dye may also be obtained with the above insoluble purple residue by boiling it several times with hydrochloric acid diluted, say ten parts of commercial acid to 100 parts of water, when the purple is converted into a blue dye.

Mr. Charles Lanth also published, on the 24th Dec., 1860, an ingenious method of obtaining purple aniline, which I shall describe when treating of blue colours obtained from aniline.

Red dyes obtained from aniline, called fuchsine, azaléine, roseine, &c.—The production of the fine colour, which bears the popular name of Magenta, was first observed by Mr. Natanson, in 1856, and more especially by Dr. Hofmann when preparing cyantriphenyl-diamine, by the action of bichloride of carbon on aniline. But it was Mr. Verguin who first brought it forward to the trade as a dyeing agent, and his mode of preparation, which was patented in April, 1859, by Messrs. Renard and Franc, of Lyons, is the following:—Into a glazed iron pan are introduced 100 parts of aniline and 60 parts of anhydrous bichloride of tin, and the whole is heated for 15 or 20 minutes, at a temperature of about 392° . The dark red liquor thus produced is left to cool, when it becomes thick and glutinous; it is then mixed with boiling water and filtered; to the filtrate is added chloride of sodium, which determines the precipitation of fuchsine, as it is insoluble in saline solutions. Magenta was afterwards prepared by C. Greville Williams, with permanganate of potash, and by Dr. D. Price, with biniodide of lead; nitric acid, and nitrate of mercury were also successfully employed. These different methods of preparing magenta were followed by several other patents, purporting to obtain the same results, and amongst them I may cite that taken on the 10th December,

1859, by Mr. Rudolph Heilman, in which the employment of arsenic acid is mentioned, and one also for the employment of the same agent on the 18th of January, 1860, by Dr. H. Medlock. As it is probable that this agent is the best suited for producing magenta, commercially, I will give a sketch of the process. Dr. Medlock heats two parts of aniline with one of arsenic acid to about 250° , and when the red colour is produced it is mixed with boiling water and allowed to cool. The red colour is thrown down by saline matter, washed, and dissolved in methylated alcohol, or the mass is digested in hydrochloric acid diluted with water, and the clear fluid solution is saturated with an excess of soda which precipitates the colour, while the arsenious acid is held in solution by the alkali. Magenta is a rather powerful organic base which is sparingly soluble in water, but its solubility is increased by the presence of an acid. It leaves a brittle mass, having a beautiful golden green metallic reflection when its alcoholic solution is left to spontaneous evaporation, and this is not peculiar to magenta, as the whole of the coal tar colours, when in a high state of purity, present the same appearance. Purple aniline differs from the red, not only in its composition, which is as follows—

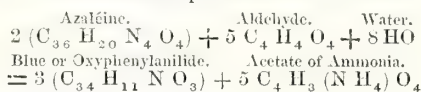


but also because the fuchsine dissolves in ammonia and in sulphuric acid with a yellow colour, and is discoloured by sulphurous acid, whilst the purple is unaffected by those reagents. Silk or wool is dyed with fuchsine by simply adding some of the colour to a slightly acidulated bath. The dyeing colour of this material is so great that 10 grains will dye 2 square yards of silk.

Of late years many attempts have been made to fix another colour obtained from coal tar, called rosolic acid ($C_{12}H_8O_3$), but up to the present time I believe all attempts have failed, with the exception of rosolate of magnesia, which was employed for some time in calico printing.

Blue colouring matters from Coal Tar.—I have already drawn your attention to the blue colouring matter patented by Mr. Girard, and carried out practically by Messrs. Renard and Franc, of Lyons. Mr. Lauth also has observed that if an alcoholic solution of red aniline, and especially azaléine, is heated with a reducing agent, such as protochloride of tin, or still better with aldehyde or hydruet of benzoïle, a blue colour is produced even at ordinary temperatures. This blue colour is soluble in water, alcohol, and acetic acid, but does not resist the action of mineral acids, alkalis, or light.

Mr. Willm has recently published an interesting paper on this aniline blue, which not only shows how aldehyde acts, but exhibits the composition of the blue itself.



Therefore the triamine azaléine has been transformed into a monamine blue, by a new chemical reaction, for aldehyde not only acts as a reducing agent, but converts a part of the nitrogen into ammonia.

Bleu de Paris.—Recently, Messrs. Persoz, de Luyne and Salvétat called public attention to a new blue which they had produced, and to which they gave the name of Bleu de Paris; this they prepared by heating for thirty hours, in a sealed tube, at a temperature of 356° , one part of anhydrous bichloride of mercury with two parts of aniline. The blue thus produced can resist the action of weak acids and alkalis, but assumes a red hue when acted only these agents in a concentrated state. Sulphurous acid has no action upon it, and it dyes animal fibres with facility.

Bleu de Mulhouse.—M. Gros-Renaud and Schaeffer have lately published an interesting process for obtaining from the red aniline, called azaléine, a purple and a blue. It consists in dissolving in a litre of boiling water, 50

grammes of white gum lac in powder, and 18 grammes of carbonate of soda, to which is added 50 grammes of an alcoholic solution of azaléine. After an hour's ebullition, the red colour is transformed into the Bleu de Mulhouse.

Azuline.—This beautiful blue colour, which resists the action of the strongest acids, and which was introduced into this country at the latter end of 1860, by Messrs Guinon, Marnas, and Bonnet, of Lyons, is prepared by them from phenic acid, and, when pure, presents itself under the form of copper-bronze coloured crystals, soluble in alcohol, to which they communicate a magnificent blue colour, slightly tinged with red. The following is the process for dyeing silk and wool:—To an acidulated lukewarm bath of water an alcoholic solution of azuline is added, and the silk or wool worked in it until it is of the required shade. It is then transferred to another bath of boiling water, strongly acidulated with sulphuric acid, when the purple colour is dissolved, leaving a most brilliant and permanent blue upon the material. The dyed silk or wool is washed repeatedly, passed through a bath containing a little tartaric acid, and dried.

Chinoline Blue.—Mr. C. Greville Williams introduced in the spring of last year a fine blue colour, which he obtained by boiling together a substance derived from quinine or cinchonine, called chinoline, with iodide of amyl. The resulting product is boiled with water and then with potash for a quarter of an hour, filtered to separate the resinous matter, when a gorgeous blue is obtained, with scarcely any shade of red. This colour is so fugitive that its use has ceased.

Green Colours from Aniline.—Although it has been known to chemists that aniline would yield a green colour under certain oxidising agents, up to the present time all efforts to dye silk or wool commercially with it have failed, but to avoid having to refer to this green colour again I may mention that Messrs. Samuel Clift, Charles Lowe, and myself, patented, on the 11th of June, 1860, a most easy and practical method of producing it under the name of *Emeraldine*, on cotton fabrics, specimens of which I have the honour to show you. The process consists in printing an acid chloride of aniline on a cotton fabric prepared with chlorate of potash, and in a few hours a beautiful bright green gradually appears, which only requires to be washed. If the green fabric is passed through a solution of bichromate of potash, this colour is transformed into a dark indigo blue, called by us *azurine*.

Naphthaline Colours.—The beautiful solid hydro-carbon naphthaline, which has yielded such a long category of substances to the chemists, has up to the present time yielded nothing of practical importance to the dyer, with the exception of a case which I shall mention presently. From it the following coloured derivatives have been obtained, namely, chloroxynaphthalic acid, perchloroxynaphthalic acid, carminaphtha, ninaphthalamine nitrosynaphthalin, naphthamein, and a body of a purple colour. It is to Mr. Perkin that we owe the knowledge of several of these substances and their colour-giving properties. In my laboratory a fine purple colour has been obtained from naphthalin, which dyes with facility silk and wool, and the process is so far perfected as to enable me to show you some silk dyed and a piece of calico printed with it.

A few months ago the scientific world were startled by the announcement, from a French chemist named Z. Rousin, that he believed he had discovered the means of making from naphthaline the important colour-giving principle which I have already mentioned to you when speaking of madder called alizarine, and what strengthened his belief was, that he thought he had succeeded in removing two equivalents of oxygen from binitronaphthaline, and transforming the nitrogen thereof into ammonia, leaving, as a residue, alizarine, as seen by his formula:—

* Those who may wish for further information on the subject of coal tar colours, should consult the number for October, 1861, of the quarterly journal of the Chemical Society, which contains a valuable paper by Mr. W. A. Perkin.

Binitronaphthaline ...	...	C_{12}, H_6, N_2, O_8
Minus oxygen ...	...	$- O_2$
Plus hydrogen ...	...	$+ H_6, H_2$
EQUALS		
Alizarine ...	...	C_{12}, H_6, O_6
Plus ammonia ...	...	N_2, H_6
Plus water, ...	...	$2HO$

The simple process which he devised to obtain a crystalline substance which gave a red colour with an alumina mordant, consists in dissolving slowly binitronaphthaline in concentrated sulphuric acid, and raising the temperature gradually to 392° , when he adds granulated zinc in successive small portions. After a short time sulphurous acid is given off, and the conversion of binitronaphthaline into a red colouring matter is effected. All that is now required is to dilute the liquor with eight or ten times its volume of water, and carrying it to the boil, filter, and allow the whole to cool, when Mr. Roussin's so-called alizarine deposits under the form of fine red or orange coloured crystals. Although this product possesses some properties similar to those of alizarine, it differs from it in many of its chemical reactions, and also because it does not furnish the purple and chocolate colours given by alizarine with iron, and iron and alumina mordants. Still these results, arrived at by Mr. Roussin, are so remarkable, that it is to be hoped that he will persevere in his endeavours to solve this interesting problem.

I cannot conclude this part of my paper without drawing the attention of those interested in the subject of colours, to a series of valuable papers, which have recently been published in the memoirs of the Institute of France, by my eminent and learned master, M. Chevreul, on the comparative affinity of various colouring matters for different fibres, on the influence of various mordants, on divers colouring matters, and, lastly, on the influence of the solar light on such dyed fabrics.

CALICO PRINTING.

The art of calico printing depends upon so many branches, of mechanical as well as of chemical science, that it is impossible for me to give detailed information of all the improvements which every department of this manufacture has undergone, during the period embraced by this lecture, but I shall draw your attention to a few of the prominent points that have come under my notice.

Engraving of Rollers.—This branch of calico printing has made great progress. Not only have the engravings acquired sharper outlines and finer details, but the methods of engraving have greatly multiplied. I may cite as instances the application of the principle of the pentagraph, by Messrs. Smith, so as to trace patterns on the surface of rollers. Also, calico printers have extensively availed themselves of Mr. Locket's improvements for producing the groundwork of prints, or as they are termed "covers," by applying "eccentric engraving," or etching, which produces with facility most complicated patterns on a varnished roller, by means of a diamond point guided by machinery. Another improvement, highly interesting in a scientific point of view, is the application of galvanism to the diamond tracer. By combining the galvanic action with an eccentric motion, most beautiful and delicate engravings may be produced. This is done by tracing the pattern with varnish on a zinc cylinder, which is so placed in the engraving machine that as a needle passes over its surface and comes into contact with the zinc, the galvanic current is established, and by simple machinery causes the diamond to trace the corresponding pattern on the copper roller. The communication is so rapid and precise that a great saving of time is effected. But if mechanical art has greatly assisted the engraver, chemistry has rendered him equally important services, by enabling him to abandon costly and cumbrous modes of impressing by force the designs on the cylinder, substituting for them a great number of etching processes. By some of these processes, as by every other addition to the resources of the engraver, an entirely new and beautiful class of engraving is produced,

unattainable by any other known means. For instance, owing to various improvements, rollers of 43 inches in circumference and 44 inches long have been introduced, enabling the calico printer to produce cheaply large furniture patterns.

En passant. I wish to call your attention to an application which has been made of a process greatly admired by many of you at the Exhibition of 1851, invented by Mr. John Mercer, the eminent calico printer, by which the beauty of dyed and printed goods was increased by passing the cotton fabrics through a strong solution of caustic lye, and afterwards through a weak solution of sulphuric acid, and then thoroughly washing. If this process has not been generally adopted, it is no doubt owing to the contraction which the cotton fibres experience under the above chemical influences, but the increased strength which the fibre thus acquires has been turned to good account, by enabling the printer to use it as a substitute for what is technically termed the "blanket" that is an endless cloth which passes over the engraved rollers with the goods to be printed. This material is found by its strength to resist better than most others the heavy strain which the blankets have to undergo during printing.

Singeing.—I shall here also allude to two improvements effected by Mr. John Thom, of Manchester. The first, applicable to all kinds of cotton or woollen fabrics, destined for printing or dyeing, consists in an improvement in the singeing or removing the nap from fabrics. The usual mode is to pass the fabrics either through a gas flame, or over a semi-circular heated iron plate. In the latter case, however, a large amount of fuel was wasted in maintaining the heat of the plate, owing to the free radiation of heat into the atmosphere, and to its absorption in the currents of cold air in contact with the plate. Mr. Thom's invention remedies these defects, by enclosing the plate under a brick arch, so that no air can enter the chamber except that which passes with the piece, and that limited quantity is, by a proper arrangement of flues, conducted into the furnace which heats the plate. The drawing which I have the pleasure to show you will fully explain this arrangement.

Sulphuring.—The second improvement of Mr. Thom was devised some years ago, but it is only recently that it has come into general use amongst printers. It is especially applicable to mixed fabrics, such as *mousselines-de-laine*, which require, after they have been singed and before they are printed, to be bleached. This was formerly effected by hanging, for several hours, the moist pieces in chambers filled with sulphurous fumes, and is now performed by Mr. Thom's process in a few minutes, by passing them over a number of rollers confined in a chamber filled with the same vapours.

Thickening Substances.—It will be readily understood that it is necessary that the mordants or colours to be printed, should be of sufficient consistency to remain on those parts of the fabrics when they are left by the rollers, so as to produce sharply-defined patterns, and as a great variety of chemical products are employed a great variety of thickeners becomes also necessary. Thus flour, starch, farina, various natural gums, albumen, lactarine, gluten, and several preparations of flour and starch called calcined farina, and patent gums are used. For details of the improvements effected in patent gums I must refer you to the lecture which I had the honour to deliver, on the 21st December, 1852, before this Society.

Madder Styles.—Although there has been no marked change in this important branch of calico printing, still there are one or two departments in which considerable improvements have been effected, to which I desire to draw your attention, and to enable you better to understand the nature of these improvements, I shall describe them in the order in which they come into play in the production of this class of goods. The first is the improvements in patterns, arising out of the before-mentioned advances in the art of engraving. Secondly, a saving in the quantity of mordant used; for the fact which I have

already stated with reference to commercial alizarine, viz., that weaker mordants are required, has been proved by Mr. Pincoff to hold good with all the other preparations of madder, the strength of the mordant required to obtain the same intensity of shade being less, in proportion as the colouring matter is purer. It is also advisable that I should here state that the mordants generally used for madder styles, are the pyrolignites, or acetates of iron and alumina, which under the influence of "ageing," to be described presently, are so decomposed or modified as to leave on the cloth, either an insoluble oxide or subsalt, which becomes the intermediate agent for fixing on the fabric the colouring matter called alizarine, iron giving from a dark purple to a light lilac, alumina from a dark red to a pink, and a mixture of these two mordants a variety of chocolate tints. Thirdly, the most important improvement which has taken place in this branch of printing, viz., a great saving of time and labour in the fixing of mordants by ageing, was first practically carried out by Mr. Walter Crum, the eminent scientific calico printer. Dr. Schunck says that, "On the proper ageing of printed goods depends, in a great measure, the success of many styles; should a room be too hot or too dry, imperfect fixation of the colours ensues, and meagre and uneven tints are obtained in the subsequent operations. To give a further idea of the importance of this step in calico-printing, I may state that 'ageing-rooms' as they are called, are in several print works of enormous dimensions, and are generally separate buildings. Those of Messrs. Edmund Potter and Co., and Messrs. Thos. Hoyle and Co., may be particularised as forming quite a feature in their works." The process of "ageing" in calico printing is that by which a mordant, after being applied to a cotton fabric, is placed in circumstances favourable to its being completely incorporated with, and fixed in the fibre. It has generally been found desirable that calico printed with a mordant, should, before dyeing, be exposed to the atmosphere for some time in the ageing-room in single folds, which, generally speaking, requires several days, the object being, as before stated, to liberate the acetic acid from the acetates of iron or sulpho-acetate of alumina, and to oxydise the oxide of iron. It was for many years believed that oxygen was the only necessary agent, and although some printers had observed that moisture facilitated the process, this fact was not generally known until Mr. John Thom, of Manchester, claimed the introduction of moisture as an important agent in the phenomena of ageing, in a patent which he took out in 1849. The first printer, however, who, as far as I am aware, practically applied this principle, was Mr. Walter Crum, F.R.S. But I cannot better show you the great saving effected by the judicious employment of steam in this process, than by giving you, in Mr. Crum's own words, the particulars of the plan adopted at Thornliebank print-works:—

"A building is employed 48 feet long inside and 40 feet high, with a mid wall from bottom to top running lengthwise, so as to form two apartments each 11 feet wide. The manner in which they are fitted up will be understood by reference to the drawing.

"In one of these apartments the goods first receive the moisture they require. Besides the ground floor, it has two open sparrd floors 26 feet apart, upon each of which is fixed a row of tin rollers, all long enough to contain two pieces of cloth at their breadth. The rollers, being threaded, are set in motion by a small steam-engine, and the goods to be aged, which are at first placed in the ground floor, are drawn into the chamber above, where they are made to pass over and under each roller, issuing at last at the opposite end (on the right-hand side of the drawing), where they are folded into bundles on one (at a time) of the three stages which are placed there. These stages are partially separated from the rest of the chamber by woollen cloths.

"While the goods are traversing these rollers, they are exposed to heat and moisture, furnished to them by steam,

which is made to issue gently from three rows of trumpet-mouth openings. The temperature is raised from 80 to 100 degrees, or more of Fahrenheit—a wet-bulb thermometer indicating at the same time 76 to 96 degrees, or always four degrees less than the dry-bulb thermometer. In this arrangement 50 pieces of 25 yards are exposed at one time, and as each piece is a quarter of an hour under the influence of the steam, 200 pieces pass through in an hour. Although workpeople need scarcely ever enter the warmest part of this chamber, a ventilator in the roof is opened when there is any considerable evolution of acetic acid.

"The mordant, as already explained, does not become fully "aged" by this process alone, although as much so as if it had hung a whole day in cold air. It has received, however, the requisite quantity of moisture (about 7 per cent. of the weight of the printed piece), and is thereby enabled, if an iron mordant, to take oxygen from the air, and to become changed (with time) into the sesquiacetate and sesquihydrate of iron. In order to be sufficiently aged, it must be left one or two, or even three days in an atmosphere still warm and moist.

"It had fortunately been ascertained long before, at Thornliebank, that exposure in single folds after moistening was not necessary. Mr. Graham's experiments on the diffusion of gases through small apertures had served to suggest that for the absorption of the small quantity of oxygen required, the goods might as well be wrapped up and laid in heaps. Accordingly, in the operation in question, the moistened goods are carried in bundles into the building on the opposite side of the mid-wall already mentioned, and deposited there upon the sparrd floors which are placed there at heights corresponding with the stages in the first apartment on which the goods are folded down. Upon these floors seven or eight thousand pieces may be laid at a time, and as each piece is 25 yards long, 100 miles is therefore the quantity that can be stored at once. It is necessary, of course, that an elevated temperature, and a corresponding degree of moisture, be preserved in the storing apartments day and night, and 80° Fahr. is sufficient, with the wet bulb at 76°. To effect that object a large iron pipe is placed along the ground-floor underneath, and moderately heated by steam, while a row of small jets in the same position are made to project steam directly into the air of the apartment. The whole building is defended from external cold, and consequently from condensation of steam, by a warmed entrance room, and by double windows and double roof. Small steam pipes are also placed at other points where they seem to be required; and the apartment with rollers is specially heated, when not in use, by a couple of steam pipes, which are placed under the ceiling of the ground floor.

"The process of ageing, as thus detailed, was in operation at Thornliebank, in the autumn of 1856. About a year afterwards it began to be adopted by other printers, and now it is already in use at, at least, sixteen different printing establishments in Scotland and in Lancashire."

Fourthly, *Dung Substitutes*.—During the last few years the various dung substitutes, such as the double phosphate of soda and lime, the arsenites and arseniates of soda, and the silicates of soda have completely taken the place of cow dung in the process of dunging, that is to say, a process which consists in passing the mordanted and aged cloth into weak and hot solutions of the above-named substances, with the view of fixing thoroughly the mordant in the cloth, and removing any excess that may have been used, without allowing it to fix itself on the white, or unmordanted parts. By the introduction of these dung substitutes, and improved dunging vats, a great saving of time, labour, and expense has been effected. Thousands of pieces are now done in the same vat, where formerly as many hundreds only could be so heated.

Fifthly, *Washing Machines*.—As madder goods have to be thoroughly washed, not only after this operation, but also after dyeing, several improved machines have been

introduced in the trade. I shall only here mention those of Messrs. Mather and Platt, Mr. Furnival, Mr. D. Crawford, the last of which is much used for steam work and loose colours, and especially that of Mr. Thomas Whittaker, which I have heard highly praised by madder and garancine printers, and a model of which I have the pleasure to lay before you, through the kindness of Messrs. Christopher Whittaker and Co. To give you an idea of the vast capabilities of some of those machines, I will cite the following fact mentioned by Messrs. Whittaker:—"Our machine will wash 6,000 yards for all kinds of dyeing purposes, and 12,000 yards for all bleaching purposes, per hour (which only requires the attention of a person of 12 or 14 years of age)."

Sixtily. After the madder goods have undergone the above improved processes they are ready for the dyebeck, where the mordants assume the colours for which they are adapted. Here, also, a slight improvement has been effected, the advantage of which is a saving of time; as it now requires for saturating the mordants with alizarine only $1\frac{1}{2}$ hours for garancine and 2 hours for madder. After leaving the dyebecks the pieces are thoroughly washed in the improved washing machines, but as the white parts (or those not mordanted) are still soiled and the colours dim, it is necessary to pass the pieces for half an hour into a rather strong soap solution heated to 180° , when the loose dye is not only removed from the white parts, but also from the parts on which colour has been fixed. To finally brighten the colours and completely clean the white portions, the pieces are passed into a weak solution of what is called "chimic," or an alkaline hypo-chlorite of soda, with a little sulphate of zinc, until the desired effect is obtained, but latterly this process has been improved by passing the goods rapidly into chimic and then through a steam-chest. As the pieces have not yet, however, a commercial appearance, they further undergo what is called finishing, that is, the pieces are passed through a solution of sour flour (flour which has been fermented for several weeks), starch, farina, &c., and then between rollers, dried, and lastly through calenders, the object of which is to fill up the interstices of the fabrics and to give them a glossy appearance. Much improvement has also taken place in this department of printing by the introduction of new machinery, especially in the methods of adapting the finish to the various markets of the world. I wish to take the opportunity of impressing upon printers the importance of dispensing, as much as possible, with the use of sour flour, and confining themselves to that of starch or farina, with the addition of about 1 ounce of sulphate of zinc per piece, for the purpose of diminishing the risk of mildew and other stains, to which a low class of printed goods are liable, during their transit in tropical climates, and especially those dyed with common garancine, bark, sumach, and peachwood.

In concluding my remarks upon madder, I wish to draw your attention to these beautiful examples of madder styles, for which I am indebted to Messrs. Symonds, Cunliffe, and Co., and of garancine styles to Messrs. Wood and Wright.

Indigo.—Most of the styles obtained with this valuable dye-stuff are due to the mixture of printing and dyeing, and only a few improvements have been effected herein, to my knowledge, during the last ten years.

First, the usual method of dyeing cotton, plain or self blue, is to fill with water large stone vats, and dissolving in them two parts of sulphate of protoxide of iron, adding one part of finely ground indigo, and then three parts of hydrate of lime. After having well stirred the whole for several hours, pieces of calico which have been hooked on a frame and dipped in lime water, are then plunged for 15 minutes into the vat, when the blue indigo which has been converted into white indigo by the protoxide of iron, and rendered soluble by the excess of lime, fixes itself on the fibre, and, on the exposure of the latter to the atmosphere, re-absorbs oxygen and becomes blue. When white pat-

terns are required, the pieces are printed before dyeing with what is called a "reserve," that is, a composition which prevents the colour from fixing itself on the fibre; the chief ingredient for that purpose is sulphate of copper, which acts by prematurely oxydising the indigo, and thus preventing its fixation. In both these cases the pieces are passed through a weak sulphuric acid bath to perfectly fix the indigo, and formerly the copper thereby liberated from the fabrics was completely lost. Mr. Joseph Leese has recently devised a method of saving this valuable metal. To effect this, the diluted solution of sulphate of copper is made to filter through vessels containing wrought-iron turnings, the acid thus dissolving the iron, which may be used as sulphate of protoxide of iron for future operations, whilst the copper deposited on the excess of iron employed may be used, if thought fit, to manufacture again sulphate of copper. To give an idea of the importance of small savings, I may state that this ingenious, but apparently trifling improvement, saved at least £3,000 a-year to one firm.

Secondly. A few years ago I was able also to effect an economy in this branch of calico printing, which consisted in extracting from the cold indigo vats which were considered by the printer to be exhausted, a considerable percentage of the indigo originally employed. Having observed that a green insoluble flocculent matter, which remained in the vats, and which was considered by chemists and printers to be simply oxide of iron, was in reality a compound of indigo and iron, I devised the following simple means of extracting the indigo therefrom:—The green pulp alluded to was conveyed from the several exhausted indigo vats into a general receptacle, and there mixed, first with a small quantity of hydrochloric acid, so as to remove the excess of lime, allowing the green pulp to settle, and running off the liquor. The so purified green pulp was then treated with strong hydrochloric acid, when chloride of iron was produced, and the indigo liberated, which required only to be washed to become again fit for use.

Thirdly. Although the printing of indigo offers great difficulty, still several printers have recourse to it from time to time, with greater or less success. The usual method of printing indigo consisted in mixing finely-powdered indigo with orpiment, or protochloride of tin, with a caustic alkali, and this process was further facilitated by printing the pieces in an atmosphere of coal gas, as devised by Mr. Bennett Woodcroft, the present learned officer of the Great Seal Patent Office, and carried out by Messrs. T. Hoyle and Sons, of Manchester. But of late years Mr. Joseph Leese, of Messrs. Kershaw, Leese, and Co., has succeeded in applying the following method, first devised by Mr. Fritzsche. The indigo is finely ground, and reduced to an impalpable powder, and then mixed with glucose, lime, and caustic soda, in such proportions as are needed to produce the shade of colour required. These materials are all mixed cold, and after the cloth is printed with the mixture it is passed through a steam chest, in which it is exposed for the space of from 30 to 60 seconds. In this short period the indigo is completely reduced and rendered soluble, when it enters into the fibre, and on emerging from the steam chest it becomes oxydised and fixed by exposure to the atmosphere, or the pieces may be immersed in a solution of an oxydising agent, such as dilute sulphate of copper, after which they only require to be washed, dried, and finished.

I am not aware of any marked improvement in the style of printing called "spirit colours," but in that of "steam colours" considerable advance has been made since 1851, rather, however, in a mechanical and artistic, than in a chemical point of view. Thus, it was owing to certain mechanical improvements that Mr. Robert Kay, calico printer of Manchester, and his workmen, had the honour of obtaining the gold medal at the Paris Exhibition of 1855. The beautiful furniture patterns which he exhibited there were the result, not only of artistic skill, and of improved machinery, by which twenty colours

can be printed at once, but also of an invention patented by Mr. J. Burch, of Macclesfield, of which Mr. Kay availed himself with great tact. Of course you must be aware that, in order to produce light shades of colour, the darker shades are diluted with gum-water, or reducing liquid; this was the work of the colour mixer, and, therefore, to produce four colours and four shades of each colour, sixteen rollers would be required. Now the invention of Mr. Burch consists in reducing the colour upon the cloth during the process of printing. The pattern of the paler shades of each colour in a chintz design being engraved on one roller, an impression in gum-water or reducing liquid is given off upon the cloth first, the impression of the other rollers then following in the usual order; where the different colours fall upon the gum-water a lighter shade is produced, owing to the dilution of the colour on those parts, which effect may be still further heightened, by more lightly engraving the corresponding parts of the colouring roller, so that a less quantity of colour shall be given off. The application of this process to furniture styles, first by Mr. Kay, and of late by Messrs. Littlewood and Wilson, and other large calico printers of Manchester, together with the substitution of the large rollers above mentioned, for block printing, has produced quite a revolution in furniture styles.

Pigment Printing.—This style remained for many years in a dormant condition, owing, first to the difficulty of finding a proper fixing agent, and then to the insufficient variety of pigments, for it was necessary to find a substance which would give the pigment the required consistency, and at the same time cause it to adhere to the cloth. Artificial ultramarine was the first pigment attempted to be printed, and in 1843 india-rubber dissolved in naphtha was proposed as a fixing agent for it, but owing to the danger of fire, and for other reasons, this method was abandoned. In 1847, egg albumen was introduced into this country for the same purpose, but owing to the coarseness of the ultramarine, and its high price, which was about £8 per lb. (it is now 1s. 3d.) the progress of this mode of printing was greatly retarded. In 1849, Mr. R. T. Pattison, of Glasgow, patented the use of caseine from milk, which he called lactarine, which promoted the use of ultramarine, buff, and stone pigments in shawl printing. About the same period, another fixing agent was introduced, viz., albumen obtained from blood. The style of pigment printing, however, received an extraordinary impetus in the spring of 1859, when the purple aniline of Mr. Perkin was successfully introduced by Messrs. James Black and Co., of Glasgow, and the French purple of Messrs. Guinon, Marnas, and Bonnet, of Lyons, by Messrs. Walter Crum and Co., Dalglish and Co., Boyd and Hamel, Inglis and Wakefield, Heys, &c., and the splendid mauves and purples which astonished the world by their beauty, fastness, and brilliancy, were obtained by printing albumen or lactarine on muslin, and fixing the same by coagulating it by the action of steam. The pieces were then passed into the dyebeck, containing in solution Mr. Perkin's aniline purple, or Messrs. Guinon, Marnas, and Co.'s French purple, first dissolved in oxalic acid, and then added to a slightly ammoniacal bath, when the albumen or lactarine took up the colour and fixed it on the cloth, the pieces being then thoroughly washed, to remove any excess of colour. In the middle of the same year, a beautiful green pigment, which had been patented in 1858 by Mr. Guignet, was introduced, and as it is extensively employed, it may be interesting to know how this green oxide of chrome is produced. Three parts of boric acid are intimately mixed with one part of bichromate of potash and a sufficient quantity of water to form the whole into a thick paste. It is then introduced into a furnace, and heated to a dull red heat, when a borate of potash and a borate of oxide of chrome are produced. The mass is allowed to cool, and is then thrown into cold water, when the borate of potash dissolves, and the borate of oxide of chrome is decomposed. The hydrate of oxide of chromium, $\text{Cr}_2\text{O}_3 + 3\text{H}_2\text{O}$, falls to the bottom as a magnificent green

powder, which requires only to be well washed and drained to be ready for use. The peculiarity of this green, as well as of one prepared by Mr. Arnaudon, of Turin, from phosphate of ammonia and bichromate of potash, is that, besides being of a brilliant green, they maintain this colour by artificial light. In the month of November, 1859, the magenta colour, or fuchsine, of Messrs. Renard, was also introduced to the printing trade, and fixed by the above described method. The beautiful pinks thus obtained were soon followed by the application of roseine, azaléine, and other aniline reds. In May, 1859, a further improvement was made, which reduced the cost of applying these colours to muslins, by Mr. Walter Crum, who made the curious observation that if the gluten of wheaten flour is allowed by exposure to the atmosphere to fall into a semi-fluid condition, it dissolves easily in a weak solution of caustic soda, which solution he used as a substitute for albumen or lactarine. About the same time, Mr. Scheurer-Kestner also introduced the use of gluten by the aid of weak acids, and Messrs. W. A. Perkin, and Matthew Gray, of the Dalmarnock Printing Company, proposed to fix the coal tar colours on fabrics by means of a lead soap.

Early in 1860 calico printers succeeded in printing the aniline colours directly with the animal mordants, instead of dyeing the mordants after the latter were printed and fixed, and thus were enabled not only to print a variety of colours on the same piece, but also to effect a great saving and simplicity in the operation. By this means the pigment style was fully developed, and an entirely new class of prints was introduced into this market.

Owing to the great extension of this style, the cost of the animal mordants employed became such a serious consideration as to cause anxious search for other means of fixing the colours, and Mr. Charles Lowe and myself having observed in 1856 that tanning matters would precipitate and render insoluble certain coal-tar colours, and having further observed, at the end of 1859, that tannin, when printed on cloth and submitted to the action of steam would become fixed, and serve as a mordant for the coal-tar colours, we took out a provisional specification on the 10th of December, 1859, for fixing the insoluble tanning compound formed by adding a solution of gall-nuts to a coal-tar colour, on cloth prepared with oxide of tin or alumina, or other metallic oxides. For various reasons this patent was not proceeded with, but in the early part of 1861 Mr. Gratrix, with the intelligent and persevering assistance of Messrs. Butterworth and Brooks, of Manchester, succeeded in fixing aniline purples, which, though faster against soap than those printed with albumen, did not so perfectly resist the action of light. The first process used by Mr. Gratrix was, with very slight modification, the same as that described above, but his second process, which I think he preferred, was the following:—He took cloth prepared with oxide of tin, such as is generally used for steam colours, and after having printed it with a gall-nut solution, submitted it to the action of steam, when the tannin became fixed and insoluble; the pieces were then passed through a dunging liquor, washed, and then into a beek containing aniline purple mixed with a little acetic acid. As the bath was gradually carried to the boil, the colour fixed itself on the tannin, and thus produced the print, but as the whites were rather soiled, the pieces were passed into a weak acid bath, or through a weak solution of printing clearing liquor, such as is used for garancine.

Early in 1860, Mr. John Lightfoot also took out a patent to fix colours, especially those from coal-tar, by various means, the chief of which was tannate of gelatine. In 1861 patents were secured by Messrs. Pattison, Miller, and Nathaniel Lloyd, and J. G. Dale. The last of these patents is, in my opinion, one of the best which have been taken out for that purpose, and is successfully worked by Messrs. Littlewood and Wilson, of Accrington. The characteristic feature of this process is the employment of

tartar emetic as the agent for fixing the aniline purple on the fabric.

It is to be regretted that the beautiful colours obtained from coal-tar should be exposed to injury in public estimation, owing to certain parties printing them with starch only, by which they are so loosely attached to the fabric, that a slight washing in pure water will entirely remove the colour and leave nothing but white cloth. By such means the reputation of this style of printing is being rapidly destroyed, and these colours, which might otherwise become a valuable addition to the printers' repertoire, are likely to lose altogether the favour of the public. This subject is so important that I cannot refrain from making another remark, viz., that if the use of coal-tar colours were properly encouraged, they would doubtless gradually decrease in price, and this country, instead of being tributary to others for its dyestuffs, would in time become the purveyor of dyeing materials, or of the substances yielding them, to the whole world.

I cannot conclude this paper without calling your attention to the immense extent to which calico printing is carried out, and the wonderful progress it has made. Thus in 1830 about 2,000,000 pieces were printed. In 1851, according to a lecture delivered before this Society by Mr. E. Potter, M.P., the estimated quantity of goods exported was 6,465,000 pieces, and the same authority estimates that in 1857 the export of printed calico amounted to about 27,000,000 of pieces.

DISCUSSION.

The CHAIRMAN said it was impossible to notice, or even to glance at, the various subjects of interest which had been brought before them. Dr. Calvert had shown in a striking manner what chemistry could do when applied to the arts, and had pointed out the great extent to which one important branch of industry had been affected by it. He had shown them also the great variety of ways in which, during the last ten years, organic chemistry had been applied to the printing, dyeing, and other industrial operations of the calico works of this country. He was sure the specimens by which the paper was illustrated would be appreciated by everyone, and would commend themselves to the attention of all present, more especially the remarkable results which had been obtained from coal tar. The extraordinary manner in which that hitherto useless product had been made to yield forms and colours which delighted the eye, showed at once what was to be effected in this field of science. The remarkable results obtained from naphthaline must also excite the interest of all who heard them. He would say no more, but call upon gentlemen to contribute still further to the interest of the meeting by their remarks.

Mr. WENTWORTH SCOTT said, in relation to aniline-red, it was, he believed, the general impression that it could only be produced by the action of oxidising agents upon aniline, its formation by other means having scarcely been even hinted at. He begged, however, to exhibit a specimen of the colour produced by heating aniline (without the intervention of any oxidizing agent at all), mixed with pure sand and pieces of pumice-stone, in a sealed tube for several days, and under a slight pressure. The temperature employed was about 220 degs. Fahr., but the process, although curious in a scientific point of view, was of no practical value, being very uncertain. On the subject of naphthaline colours he felt himself more at home, having devoted his attention to them for a lengthened period. About six years ago, viz. in 1856, he attempted to form alizarine artificially from binitro-naphthaline, and obtained a brilliant red-colouring matter, which, early in 1857, he showed to his friends Dr. B. W. Richardson and Dr. J. Forbes Watson. This red colour (which he provisionally named "dianthine," from the carnation tint of its alcoholic solution), was obtained by a process differing in many respects from the more recent one of M. Roussin. He considered that some hydro-

carbon, like sulphonaphthalic acid, or naphthaline itself, should be added to the acid solution of binitro-naphthaline as well as a reddening agent, and that M. Roussin employed too high a temperature. Mr. Scott further showed several specimens of wool dyed at Huddersfield with madder, and his own imitations of the same produced with "dianthine." He considered that more than one substance resulted from the process just mentioned, and thought he had detected in the dianthine, by means of the microscope, crystals of true alizarine. Dianthine, when treated by certain oxidizing agents, and afterwards with alkalies, such as ammonia, in the presence of alcohol, afforded another colour of a scarlet tint; a weak solution of which he begged to hand round for inspection. Those acquainted with the colour of a solution of alizarine would here see a resemblance. These colours, he remarked, in conclusion, would be practically tested in the course of the present year.

Mr. THOMAS WINKWORTH did not rise to discuss this subject, but merely to express his hope that his friend, Dr. Calvert, who, for want of sufficient time, had not had a fair opportunity of laying before the Society this evening many details of this copious and interesting subject, so generally important, but particularly so to the manufacturers of textile fabrics, would, at a later period of the session, do them the favour to renew his revelations. At that time many foreigners interested in manufactures would, in all probability, be in London as commissioners or jurors at the ensuing International Exhibition, and he was sure they would be pleased at an opportunity being afforded them of meeting a gentleman who was so eminent in the branch of science to which he had devoted himself, and who had made so many discoveries in the application of chemistry to the arts, some of the results of which they had around them in the room. He was aware that Dr. Calvert had great demands upon his time in the neighbourhood in which he resided, but at the same time he was sure that he would put himself even to inconvenience if, by so doing, he could meet the wishes of the Society in this respect.

Mr. GEORGE WALLIS said there was one fact in connection with this question which would be interesting to the members of the Society, inasmuch as they might expect a very excellent illustration of the progress in science as applied to calico printing in the forthcoming International Exhibition. Being at Manchester during the meeting of the British Association there, he had induced his friend Mr. Rumney to undertake a complete illustration of the various substances used in calico printing, and particularly those which had been discovered since 1851. That having been undertaken by Mr. Rumney, the meeting might rest assured that it would be well done, so that those who were interested in this subject would have the opportunity of going step by step through the illustrations of the very excellent paper they had heard this evening. He regretted that he had forgotten till that morning that this paper was to be brought forward, or he should have looked up some notes which he had made upon calico printing in the United States—not that he could have added anything to the chemical part of the subject, but there were many ingenious labour-saving machines in calico printing which he had seen in operation in America, of which he thought a description might well be brought before the public. He had not seen any of those machines in use in this country, the descriptions of them were buried in the depths of a blue book, in Mr. Whitworth's and his own report upon the Exhibition of Machinery in America in 1853; and he thought it might be of service if at some future time he took an opportunity of bringing this subject before the attention of the Society, because in many instances the labour-saving character of those machines was very great, and although in England labour was plentiful and comparatively cheap, they would nevertheless show the expedients which an ingenious people had adopted to supply by mechanical means the wants of hand labour.

Mr. JONES mentioned that a Roman Catholic mission-

ary had sent to the Chamber of Commerce at Lyons, in 1857, a detailed account of the dye Lo-kao, and he mentioned 5s. per ounce as the price he paid for the specimen forwarded. He also explained that it was manufactured from the bark of the wild vine, and was treated in its process of manufacture like the indigo plant.

Mr. QUIN, as superintendent of the chemical department at the forthcoming exhibition, could bear his testimony as to what might be anticipated from the illustrations of calico printing by Mr. Rumney, as mentioned by his friend Mr. Wallis.

The CHAIRMAN said they were all indebted to Dr. Calvert for having brought this subject before them; also to Mr. Wentworth Scott for his practical remarks. He hoped that gentleman would be led to prosecute his researches further. He had gone to the extent of obtaining what chemists call dianthine, and had got results which led him to believe that he had obtained crystals of alizarine. If it could be got at all it could be procured in any quantity when once they knew how to go about it. The remarks of Mr. Wallis held out the hope that he might be induced to give the society the benefit of his large experience in connection with this subject, and to bring before them a history of American machinery as applied to this branch of industry in a more attractive form than was to be found in the parliamentary blue books. He hoped the suggestion of one of the members of the council would not be lost sight of, but that they might have an opportunity of having further details of the practical methods in which these various substances had been applied. He begged to propose a vote of thanks to Dr. Calvert for his very able and interesting paper.

The vote of thanks having been passed,

Dr. CRACE CALVERT expressed his readiness to give another paper on this subject at any time the Council might think most advisable. He had no doubt the illustrations of the substances used in calico printing, promised by Mr. Rumney for the International Exhibition, would be extremely valuable; but it was easy to understand that in order fully to appreciate the value of such illustrations, it was necessary that some one should give to the members of this Society some explanations which would enable them to see the application of these discoveries. Thus, if a person saw a piece of print of any particular colour, it was desirable that he should know how that result was obtained, and then when Mr. Rumney's collection was placed before him he would at once see the bearings of the various improvements and the important results which must flow from them. The object of papers read before this Society was to diffuse knowledge which might lead to further discoveries. The great thing was not to stop where they were, but to make their present knowledge the key to further progress. And how was this to be effected, if they were not perfectly acquainted with what had been done up to the present time. He wished those who were interested in this question to look over the specimens of prints which would remain in the room a day or two, and by reading the labels attached to each, they would be better able to understand what was explained in the paper, and in that way the reading of the paper would become practically interesting and useful. There was one point he would refer to which arose out of the remarks of Mr. Willis, that was the extraordinary improvements that had taken place in the art of engraving. Those pieces of furniture styles, which, to a casual observer appeared to have nothing very remarkable about them, were, nevertheless, extraordinary productions. A few years ago they would have cost twelve or fourteen shillings a piece, because they were done by hand-labour and block-printing, but now, by the aid of machinery and the art of engraving, and by the introduction of the large copper rollers referred to in the paper, these results were obtained at a much cheaper rate. Such goods were now printed by hundreds of thousands of yards for the markets of Persia, Egypt, and India, by our Manchester manufacturers. He was

happy to find that the gold medal at the Paris Exhibition of 1855 was gained by a Manchester manufacturer for this class of goods, and he hoped the same honour would be conferred upon an English manufacturer in the Exhibition of the present year. Referring to Mr. Wallis's observations on the importance of the improvements in machinery which had taken place in the last ten years, Dr. Calvert remarked that owing to these improvements, not only were goods produced at a cheaper rate, but the machinery employed for finishing goods furnished remarkable instances of mechanical skill applied to calico printing. He directed attention to the superior style and variety of finish observable in the goods of the present day, and this he said was entirely due to the improvements in machinery; therefore, any gentleman who brought before the Society details of progress in that direction would render great service to the public at large.

The Paper was illustrated by a large collection of chemical substances and printed fabrics referred to in the Paper furnished by Dr. Crace Calvert, and also by a collection of printed fabrics lent by Mr. A. Salamons.

The Secretary announced that on Wednesday evening next, the 12th inst., a Paper by Mr. Edward C. C. Stanford, F.C.S., "On the Economic Applications of Sea-weed," would be read.

Home Correspondence.

VENTILATION OF MINES.

SIR,—I beg to call the attention of those of your readers who may be connected with our collieries, to my letter on this subject inserted in your *Journal* of the 8th of March last, page 262. The two principal points maintained in that communication are:—

First.—The absolute necessity of having at least two separate shafts, one for the ordinary working of the mine, and the other for ventilation, but both equally accessible to the miners from below.

Secondly.—That the ventilating machinery, of whatever kind, shall be entirely above ground.

The contravention of both these rules has just caused two most lamentable disasters, involving in the case of the New Hartley works, not only the destruction of two hundred human beings and the consequent destitution of four hundred widows, children, and others, but also the probable ruin, eventually, of the proprietors of the colliery. In both cases the furnaces were underground, and when the ventilation was arrested, of course the whole of the works became deadly with carbonic acid gas and carbonic oxide, besides the usual impurities, always exhaled in the workings. The sole cause of placing the furnace underground, is the desire to avoid the expense of building a tall smoke chimney over the upcast above ground, which alone would, in many cases, be sufficient to effect the intended purpose, but which always renders any kind of ventilating apparatus both simple and inexpensive.

At the New Hartley works the managers were not content with the inevitable accidents inseparable from all underground works, but they must superinduce all those that by any possibility can be caused, by having one shaft only for all purposes; and, in addition, a projecting half of an enormous engine-beam right over the pit, well-knowing that cast-iron is nearly as fragile as glass, and always breaks without giving the slightest warning. Large castings are, moreover, notoriously unsound, as they cannot be cast with sufficient head to compress the metal while setting; and even wrought-iron will break, in hundreds of instances, quite short, without notice, presenting a fracture not very dissimilar from that of cast metal.

The fatal mistake, however, was that of allowing any material or piece of machinery whatever to be placed over the shaft, the same not being indispensably necessary for lifting and lowering the daily shifts of the miners, overmen, and viewers, almost hourly passing up and down the shaft.

There is no true economy in such inefficient half-measures, because the produce of the mines will be greater, and far more profitable to the owners, when the miners shall only have their proper difficulties to contend with, and shall be enabled, by improved measures, to carry on their work with plenty of light and fresh air; besides, it is impossible to put human life, or even that of horses, in competition with sordid economy.

The fact is, that associations of men, such as railway directors, coal-owners, ship-owners, and others, however individually they may be, and are, gifted with the virtue of humanity, they are—as a body—as hard and stubborn as granite. Ship-owners, indeed, publicly declare that it is no part of their business to provide any measures for the safety of human life from disasters at sea, excepting only so far as they may be compelled to do so by sundry Acts of Parliament.

These malpractices will never be repressed or amended without legislative interference, but as it would be unwise to be continually adding enactments to enactments, already too numerous by thousands, a better mode would be—to render the present laws more effective by enabling juries to find a verdict of “Manslaughter” against the owner, director, manager, or whosoever may have supreme control of the works, for each individual case of death or mutilation caused by preventable accidents.

My attention has been more immediately directed to this subject by a notice in your last *Journal*, page 164, of M. Mozard’s “Improvement in the Miner’s Safety-Lamp,” which I have already stated, in my former communications, ought only to be used as an indicator of danger, and not as a working light, because in itself it is liable to a thousand accidents, and at best only furnishes the miner with a miserable light, and enables him to work in an atmosphere highly detrimental to the human frame.

I am, &c.

HENRY W. REVELEY.

February 3, 1862.

Proceedings of Institutions.

LOCKWOOD MECHANICS’ INSTITUTION.—The annual general meeting of the members of this Institution was held on Wednesday evening, 29th January, 1862, Mr. G. SHAW in the chair. The secretary read the report, from which it appeared that there are at present 141 male and 44 female members. There are 11 classes for males, taught by eight paid teachers and three voluntary teachers. There are also four classes for females, taught by two paid and two voluntary teachers. The receipts from all sources had been £106 2s. 10½d., and the disbursements £106 19s. 11½d. Altogether the Institution is not in so favourable a position as it was the previous year, but the report attributes this to commercial depression and other untoward events during the past year. The following gentlemen were elected to serve on the committee for the present year:—Bentley Shaw, Esq. J.P. (President); Mr. Spencer Beaumont (Treasurer); Rev. J. B. Bensted, M.A.; Rev. John Barker; Messrs. Charles Kaye, Samuel Ogden, James Brierley, Samuel Lodge, John Dow, Alfred Crowther, Thomas Haigh, Nathaniel Berry, Timothy Tate, Samuel Black, William Whiteley, James Kenworthy, F. W. Armitage, J. W. Spedding, Henry Taylor, and Benjamin Armitage, jun. The Rev. JOHN BARKER and Mr. NATHANIEL BERRY each addressed the members present, urging upon them the necessity of closer application to, and more perseverance in, the several branches of knowledge taught in the classes of the Institution.

MEETINGS FOR THE ENSUING WEEK.

- MON.....Roy. Geographical, 8½. 1. Dispatch from His Excellency Sir Henry Barclay, Governor of Victoria, “On the Expedition, which, under the late Mr. R. O’Hara Burke and Mr. W. J. Wills, with Messrs. Grey and King, succeeded in crossing the Australian Continent, from Melbourne to the Gulf of Carpentaria.”—Communicated by His Grace the Duke of Newcastle; and 2. “Journals of the Expedition, with the Astronomical Observations of Mr. Wills.”—Communicated by Governor Barclay to Sir Roderick I. Murchison. 3. “Proceedings of the Exploring Party, under Mr. F. T. Gregory, in North-West Australia.” 4. Letter from Capt. Cadell to Sir Roderick I. Murchison, “On the Country to the East and North of the Grey and Stanley Ranges.”
- Medical, 8½. Mr. Henry Thompson, F.R.C.S. Lettsomian Lectures.—1. “Lithotomy.—The several methods which are adopted at the present day for the male subject.”
- TUES. ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Continued discussion upon Mr. Samuda’s paper “On Iron-Plated Ships,” &c.
Zoological, 9.
Syro-Egyptian, 7½. 1. Rev. Mr. Cowper, “On Ancient Syrian Philosophy, from a Syriac MS.” 2. Mr. Joseph Bonomi, “On the Camel, and its relation to Egypt.”
Royal Inst., 3. Mr. John Marshall, “On the Physiology of the Senses.”
- WED. ...Society of Arts, 8. Mr. Edward C. Stanford, F.C.S., “On the Economic Applications of Seaweed.”
Graphic, 8.
Microscopical, 8. Annual Meeting.
Literary Fund, 3.
Royal Soc. Literature, 8½.
Archæological Association, 8½.
- THURS. ...Royal, 8½.
Antiquaries, 8½.
Philological, 8.
Royal Soc. Club, 6.
Royal Inst., 3. Professor Tyndall, “On Heat.”
- FRI.Astronomical, 3. Annual Meeting.
Royal Inst., 8. Dr. Odling, “On Mr. Graham’s Researches in Dialysis.”
- SAT.Roy. Asiatic, 3.
Royal Inst., 3. Rev. A. J. D’Orsey, “On the English Language.”

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, January 31st, 1862.]

- Dated 19th September, 1861.
2341. W. T. Tongue and J. Greer, Liverpool—An improved portable self-acting water-engine for extinguishing fires and other purposes.
2342. J. H. Wilson, Liverpool—Imp. in pumps chiefly applicable to ships’ lift pumps.
Dated 27th September, 1861.
2415. G. Smith, Liverpool—Imp. applicable to gas meters.
- Dated 9th October, 1861.
2520. G. Davies, 1, Serle-street, Lincoln’s-inn—Imp. in machinery for manufacturing shoes for horses and other animals. (A com.)
- Dated 21st October, 1861.
2626. Major J. S. Phillips, 10, College-crescent, Finchley-road—A new method and apparatus for the propulsion of vessels through the water.
- Dated 25th October, 1861.
2677. T. Richardson, Newcastle-on-Tyne, and R. Irvine, Hurler, Renfrewshire—Imp. in treating bones and gelatine.
- Dated 4th November, 1861.
2769. W. Clark, 53, Chancery-lane—Imp. in water meters. (A com.)
- Dated 15th November, 1861.
2855. W. H. Balmain and J. Kean, St. Helen’s, Lancashire—Imp. in the manufacture of flowers of sulphur and roll and other forms of sulphur.
- Dated 26th November, 1861.
2974. D. Ker, Plymouth—An imp. in the manufacture of soap.
- Dated 16th December, 1861.
3156. J. Aitken, Lasswade, near Edinburgh—Imp. in supplying water to water wheels.
3158. C. Baumann, Altdorf, Weingarten, Wurtemberg—Imp. in buttons.
- Dated 19th December, 1861.
3185. A. Treuille and F. X. Traxler, 53, Chancery-lane—Imp. in the manufacture of paper and card paper or cardboard, with the object of preventing forgery and alterations in cheques and other documents, and which imps. are also applicable to the manufacture of playing cards and railway and other tickets. (A com.)

Dated 20th December, 1861.

3196. W. Clark, 53, Chancery-lane—Imp. in apparatus for the manufacture of matches. (A com.)
3199. E. E. Perea, Moorgate-street—An improved composition for cleaning and revivifying woollen cloths and other fabrics, and the colors thereof. (A com.)

Dated 21st December, 1861.

3210. W. C. Miles, Railway-place, Shoreditch—Imp. in lamp glasses for lamps burning paraffine and other light mineral oils.

Dated 24th December, 1861.

3216. C. Smith, Bedford—Imp. in stays.
3218. C. Smith, Bedford—Imp. in stays.

Dated 26th December, 1861.

3228. T. Simmons and T. Timmins, Birmingham—Certain imp. in urns or vessels for holding and supplying hot water, tea, coffee, or other liquids separately or conjointly, as also in the stands for the same.

Dated 27th December, 1861.

3240. W. Turner and J. W. Gibson, Hammersmith, Dublin—Imp. in rolling bridges.

Dated 30th December, 1861.

3258. J. B. Payne, Chard, Somersetshire—Improved machinery for the manufacture of laid and other twine, lines, ropes, bands, and other cordage, whether made of hemp, flax, or other fibrous substances, or of wire.

Dated 1st January, 1862.

8. R. A. Brooman, 166, Fleet-street—Imp. in shears or scissors, chiefly applicable to be employed in the manufacture of laces. (A com.)
11. B. Rhodes, Old Ford, Bow—Imp. in forming or making straight and bent pipes and bends for pipes, and also vessels of various shapes, and in coating and protecting objects and articles of various forms, and in the apparatus to be employed therein.
12. E. Banfield, Ilfracombe, Devonshire—Imp. in lubricating and maintaining in working order axle journals and brasses applicable also to other journals and bearings.
15. J. Howard and E. T. Bousfield, Bedford—Improved apparatus applicable to steam cultivation.

Dated 2nd January, 1862.

19. A. M. P. Airiau, Paris, Rue St. Dominique, St. Germain, No. 8—A new musical instrument.
22. G. Jeffries, Golden Ball-street, Norwich—Imp. in breech-loading fire-arms.

Dated 3rd January, 1862.

25. G. Stracey, Rackheath-hall, near Norwich—Imp. in the manufacture of artificial fuel.
27. W. E. Gedge, 11, Wellington-street, Strand—Imp. in apparatus for dressing, cleaning, or sifting grain.

Dated 7th January, 1862.

44. F. Shaw, Sheffield—Imp. in apparatus for stopping railway trains.
61. J. Brunt, 15, Rue Petrelle, Paris—Imp. in gas meters.
63. D. Wilson, Colombo, Ceylon—Imp. in machinery for pulping and preparing coffee.
65. D. Wilson, Colombo, Ceylon—Imp. in hydraulic presses.
67. R. A. Brooman, 166, Fleet-street—Imp. in apparatus for carburetting and burning gas. (A com.)
69. H. Barber, Belgrave, Leicestershire—Imp. in safety lamps.

Dated 10th January, 1862.

70. A. R. Le Mire de Normandy, Odin-lodge, King's-road, Clapham-park—An improved method of fixing tubes in tube plates.
71. J. Carter, Tipton, Staffordshire—A new or improved draining plough.
73. M. Wigzell, The Strand, Topsham—An improved double acting ventilator for railway carriages and other carriages and compartments.
75. J. Oates, Mirfield, Yorkshire—Imp. in washing machines.
76. H. Darvill, New Windsor—An improved method of hardening chalk for building purposes.
77. W. H. Preece, Southampton—Improved apparatus for signalling upon railways.
79. J. Kenyon, Ivy-cottage, Lower Heath, Hampstead, and A. Horn, Great James-street, Bedford-row—Imp. in railway signalling by electricity, and in the arrangement of apparatus for that purpose.

January 11th, 1862.

83. J. White, 7, Trinity-street, Southwark—Imp. in lubricating, or oil cans, or oil feeders, and in the mechanical arrangements for regulating the flow of oil therefrom.
84. L. Mackvidy, Greenock—Imps. in apparatuses for reburning animal charcoal.
85. T. Scott, Nelson-square—Imp. in steam engines.

Dated 13th January, 1862.

88. J. M. Rowan, Glasgow—Imp. in the manufacture of iron and steel.
89. T. Gilbert, Birmingham, C. Gilbert, and T. Haddon—An imp. or imp. in the manufacture of swivels for guns, and in machinery to be employed in the said manufacture.
91. T. Soar, Nottingham, J. Belshaw, Radford, and M. Soar, Nottingham—An improved knocker to be attached to doors, shutters, or other parts of premises to which the same may be applicable and applicable also for the reception of letters and other documents.

95. H. Schottlander, Paris—Imp. in albums for containing photographic and other pictures.

97. J. Betteley, Liverpool—Imp. in ship building.

98. T. W. G. Treeby, 1, Westbourne-terrace Villas, Paddington—An improved method of, and apparatus for, producing rifled cannon and fire-arms.

99. J. G. Marshall, Leeds—Imp. in the preparation of flax, hemp, and other fibres previous to being spun.

Dated 14th January, 1862.

101. J. Carter, 20, Danvers-street, Paulson-square, Chelsea—An improved shaft tug or bearer used in harness.
104. J. Jack, Liverpool—An improved method of preparing cores for moulding or shaping metals.
105. M. Chadwick, Radcliffe—Imp. in machinery for folding or plating cloth and for measuring the same.
109. C. Hill, Ferryside, Kidwelly, Carmarthen—Imp. in the manufacture of lubricating compounds.
111. J. G. Marshall, Leeds—Imp. in the machinery and processes for producing fibre from woven and other textile fabrics.

Dated 16th January, 1862.

120. T. Matanle, 5, Wilnot-square, Bethnal-green-road—An improved runner fastening for umbrellas, parasols, sunshades, and other similar articles.

Dated 18th January, 1862.

130. J. Tow, Poland-street, Oxford-street—Imp. in the construction of stoves or fire places.
132. T. Newton, Manchester—Imps. in sights for rifles.
138. W. L. Winans, Brighton—Imp. in the manner of mounting and apparatus for manœuvring cannon or ordnance on ships or vessels of war and floating batteries.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

196. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the prevention or removal of incrustation in, or from, steam generators, and in the apparatus employed therein. (A com.)—25th January, 1862.
218. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in engines actuated by heated air, or by combinations of air and steam. (A com.)—28th January, 1862.

PATENTS SEALED.

[From Gazette, January 31st, 1862.]

January 31st.	
1928. C. Schinz.	2063. G. Ingram.
1934. A. Prince.	2088. M. A. F. Mennons.
1943. R. A. Brooman.	2109. W. D. Player.
1944. F. Seiler.	2222. M. A. F. Mennons.
1950. R. Wappenstein.	2230. J. Russell.
1952. F. Tolhausen.	2268. M. A. F. Mennons.
1953. J. Mac Morran.	2295. A. C. Jennings.
1957. A. V. Newton.	2524. J. J. Russell.
1966. T. G. Webb.	2575. J. J. Adams.
2026. W. Wilds.	2686. J. L. Sicard.
2053. W. Bennett.	2810. A. B. B-rard.
	2863. G. T. Bousfield.

[From Gazette, February 4th, 1862.]

February 4th.	
1959. F. Silveston.	2029. S. Carey and W. M. Pierce.
1981. A. J. Mott.	2065. W. Fitkin.
1982. C. P. Moody.	2074. R. S. Lambert.
1986. H. Chatwin.	2078. N. Fisher.
1989. J. Gray, T. Kershaw, B. Crowther, and A. Dean.	2083. W. Clark.
1990. R. A. Godwin.	2094. J. Kane.
1997. A. Barclay.	2102. W. Baines.
1998. M. Wigzell.	2104. J. Whitworth and W. W. Hulse.
1999. M. Wigzell.	2117. J. Cranston.
2015. B. Cooper.	2143. W. S. Guinness.
2017. E. A. Rippingille.	2676. J. B. Schalkenbach.
	2738. W. J. Williams.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, January 31st, 1862.]

January 27th.	January 29th.
280. J. Grimond.	301. S. Tearne.
January 28th.	304. J. Hirst, jun., and J. Hol- lingworth.
576. J. Robertson.	
422. J. T. Jones.	

[From Gazette, February 4th, 1862.]

January 30th.	January 1st.
295. W. E. Newton.	398. S. H. Huntley.
January 31st.	February 1st.
312. S. D. Davison.	309. W. Clayton and J. Good- fellow.
357. A. Clark.	326. P. Adie.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, January 31st, 1862.]

January 27th.	January 22th.
250. G. Ritchie.	320. A. E. L. Bellford.

[From Gazette, February 4th, 1862.]

February 1st.
244. T. O. Dixon.

Journal of the Society of Arts.

FRIDAY FEBRUARY 14, 1862.

MEMORIAL TO HIS LATE ROYAL HIGHNESS THE PRINCE CONSORT.

A special general meeting of this Society was held on Friday last, duly convened in accordance with Bye Law 50, for the purpose of receiving a report from the Council in reference to their vote of 1,000 guineas to the fund now being raised for a memorial to the Prince Consort. The chair was taken by Mr. J. GRIFFITH FRITH.

The Secretary read the Bye Law under which the meeting was convened, and the advertisement convening the meeting.

The Secretary then read the following report from the Council:—

The Council have thought it right to vote a sum of 1,000 guineas towards the erection of the Memorial to their late lamented President, his Royal Highness the Prince Consort. In order to give the fullest effect to that vote, the Council have called a General Meeting of the Society, that all its members may participate in the act.

The Council is confident that the Society at large will eagerly confirm the appropriation of this money to the object of commemorating the rare virtues of a Prince to whom this Society, above all others, owes so much—not only for the great impulse given by his Royal Highness to the progress of Arts, Manufactures, and Commerce, but for the increased social status which his enlightened influence has contributed to confer on the leaders of industry.

If facts were requisite to impress Members with the sense of gratitude for the remarkable services of the Prince to this Society, they would be found in the following statement:—In 1843, the year of his Royal Highness' election as President, the number of subscribing members was 319; their payments, £724; and the deficit on the year £298. At the time of his death the number of members was 2,454, the Society had formed a Union of 300 Institutions, extending its influence over the United Kingdom and the Colonies. Its income had increased to nearly £5,520. It had paid off large incumbrances, and it has upwards of £13,000 funded property.

The CHAIRMAN moved that the report be received and adopted.

The motion having been seconded by Mr. J. SCOTT RUSSELL, F.R.S., was carried unanimously.

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £446,000, have been attached to the Deed.

Guarantors holding ivory tickets for visiting the building are informed that those tickets are no longer available.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

On Sunday last, three enormous ensigns waved over the top of the Eastern dome, proclaiming to the public the practical completion of the work. The glazing only remains to finish it, inasmuch as the whole of the ironwork is completed, and the centreing supporting the ribs struck. The finial, with its gilded globe and spear, was hoisted and fixed on the 6th inst. Rising, as it does, 53 feet above the apex of the dome, it presents a striking and graceful finish to this stupendous and interesting feature of the work.

It will give consolation, perhaps, to those who have expressed publicly their doubt as to the strength of this structure to hear, that on the centreing supporting the ribs being removed, the face of the apex showed a deflection of one-eighth of an inch, an inappreciable amount when the immense size of the girders and also the play left for the expansion of the iron are considered. The western dome is fast following at the heels of her sister, and by the end of the coming week there will be little of the work left for completion. On Thursday morning the gilded finial was erected on this dome.

The Picture Gallery is ready for Mr. Crace to decorate. His particularising of the nave and transept roofs is criticised as disregarding the construction of the roof, giving it the appearance of great instability, but as a whole his colouring is successful.

Some idea of the rapidity with which the contractors are now finishing off the work may be formed by the progress made in the brick casing for the steam pipes in the western annexe, which was completed on Wednesday, having only been commenced on the Wednesday previous. In this casing there are 4,100 feet of 9-inch brickwork four feet high.

The Commissioners, impressed with the necessity of convincing the public that they might feel perfectly secure in every part of the building, proceeded on Wednesday to test the gallery floors by a dense crowd of men. This to a scientific mind cannot be considered other than a work of supererogation, yet, for the satisfaction of the public, who do not appreciate the value and accuracy of certain formulæ for calculating the strength of materials, such a step was necessary.

Before the scantlings of the various materials which form the floors were decided upon, every part was actually tested by a dead weight, equal to that of the densest crowd that could by any possibility be collected. The cast-iron girders were made capable of carrying three times the load that could be put on them, and a specimen of the flooring employed was loaded with bricks to 140 lbs. to the superficial foot. It could not have been, therefore, with any misgiving that

the contractors marshalled their men for proving the floors on the 10th inst., but it must have been with a feeling of pride and defiance that they awaited the result of the experiment, the object of which was to enable the Commissioners to say "The floors are perfectly safe; we have had a dense crowd of men walking and running over them, and they have not yielded a fraction."

At 3 p.m., the Commissioners assembled in the building, and some of the Building Committee were also present. A body of 400 workmen were arranged so as to present a front equal to the width of a gallery, and headed by Mr. W. Fairbairn, acting as leader, and Messrs. Clemence and Ashton, clerks of works, as adjutants, and the master blacksmith as sergeant-major, they dashed up the stairs, at the head of which they formed into as dense a mass as possible, and then walked and ran all over the galleries. The result of the test was most satisfactory. The floors, of course, vibrated with the heavy moving load, yet they always recovered themselves on the men being withdrawn. As the living mass moved on, the deflections of various portions of the floor were observed; these were found to average as follows:

For 25 feet, cast-iron girders. . . $\frac{1}{4}$ inch.
 „ 25 feet, suspended trusses . . $\frac{5}{8}$ „
 „ $8\frac{1}{2}$ feet, floor joists. 1 „

The Commissioners formally took possession of the building on Wednesday last, and the French Commission had their space delivered to them at the same time. A model has been made of the arrangements to be adopted, and the French goods will commence their arrival forthwith. Some Russian and Colonial objects are already in the docks.

The responsible work of receiving and placing the goods in their proper places in the building, has been confided to Mr. R. Thompson, who performed a similar duty in Dublin and Paris.

Mr. Philip C. Owen has been offered the post of Foreign Superintendent.

The Commissioners have appointed Dr. Lyon Playfair, C.B., as the Special Commissioner for the Juries; the same post which he occupied so successfully in 1851. The leading "Decisions" to guide the Juries were published last September.

Arrangements have been concluded by her Majesty's Commissioners with Mr. Robert Hunt, F.R.S., who, it will be remembered, produced the Synopsis and Hand-Book of the Exhibition of 1851.

Mr. Robert Hunt has undertaken to produce a SYNOPSIS of the Contents of the Exhibition, which shall be ready for sale, in the building, on the 1st of May; and a HAND-BOOK, in Parts, which shall popularly describe the important productions of every class—whether British or Foreign—and which is to be published by the 1st of June.

By this arrangement it is hoped that the public will be furnished, on the one hand, with a cheap and easy guide to the immense collections in the "Synopsis;" and on the other, with a work of real educational value in the "Hand-Book" which will clearly describe every group which may possess any interest—and, indeed, interpret the value of each effort of thought—which may be found in that industrial gathering.

Mr. Robert Hunt is bound to publish the "Synopsis" at the low price of 6d.; and the "Hand-book," in parts, which are not to exceed 6d. each, and which, when completed, shall sell bound for 5s.

NINTH ORDINARY MEETING.

WEDNESDAY, FEB. 12TH, 1862.

The Ninth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 12th inst., Dr. A. W. Williamson, F.R.S., Professor of Chemistry, University College, London, in the chair.

The following candidates were proposed for election as members of the Society:—

Ashworth, Edmund	Egerton-hall, near Bolton.
Barber, Charles	36, Fenchurch-street, E.C.
Bonnewell, Wm. Henry..	76, Smithfield, E.C.
Brearey, Plummer T. ...	20, Aldermanbury, E.C.
Brooks, Robert, M.P. ...	{ St. Peter's-chambers, Cornhill, E.C., and Woodcote-park, Epsom.
Browne, Edward	Oak-hill, Surbiton, S.W.
Buckley, Nathaniel	Ashton-under-line.
Bullock, W.	11, Paternoster-row, E.C.
Capper, C.	9, Mincing-lane, E.C.
Cocks, James... ..	25, Cornhill, E.C.
Foster, Wm. Watson ...	{ 157, Fenchurch-street, E.C., and Felling's Works, Newcastle-on-Tyne.
Gunn, Alex. Hamilton ...	{ 79, Lombard-street, E.C., and 21, Water-street, Liverpool.
Horsey, Thomas	13, Billiter-square, E.C.
Hyde, John	7, Finsbury-place South, E.C.
Lloyd, Sampson S.....	Bank, Birmingham.
Mason, Hugh.....	Ashton under line.
Moore, H. W.	3, Billiter-square, E.C.
Norton, Fletcher C.....	{ 1, Albany-terrace, Regent's-park, N.W.
Payne, James Jabez	54, Aldermanbury, E.C.
Penny, George	{ 5, Queen-street-place, Upper Thames-street, E.C.
Percy, John Thomas ...	26, Great Tower-street, E.C.
Rate, Lachlan M.	21, Upper Grosvenor-st., W.
Ridgway, Rev. Jas., M.A.	29, Oakley-square, N.W.
Roberts, Chas. William..	17, St. Paul's Churchyard, E.C.
Rosenthal, Ludwig ...	14, Mincing-lane, E.C.
Smith, William.....	9, Mincing-lane, E.C.
Spence, James	{ 77 and 78, St. Paul's Church-yard, E.C.
Styles, Thomas	148, Upper Thames-st., E.C.
Sugden, S.	12 and 16, Aldermanbury, E.C.
Trollope, Robt. Leonard.	15, Parliament-street, S.W.
Turner, Archibald.....	{ 63, Aldermanbury, E.C., and Bow Bridge India Rubber Works, Leicester.
Veillard, Constant	{ 29, Mark-lane, E.C., and 3, Foulis-ter., Brompton, S.W.

Whitmore, Charles S. ...	57, Rutland-gate, S.W.
Wier, A. M.	28, Threadneedle-street, E.C.
Wood, James.....	89, West Smithfield, E.C.

The following candidates were balloted for and duly elected members of the Society :—

Bridson, T. Ridgway....	Bridge-house, Bolton.
Challon, Charles	3, Berners-st., Oxford-st., W.
Clark, George	Albion-chambers, Bristol.
Dunning, Joseph	Langley, near Haydon-bridge, Northumberland.
Francis, David	24, Mile-end-road, E.
Foxwell, Thomas S.....	Shepton Mallet.
Howes, John	45, Hamilton-ter., St. John's-wood, N.W.
Smith, Henry	Bankfield, near Ulverston.
Thomson, John Robert...	19, Cadogan-place, Lowndes-square, S.W.
Wyon, Joseph Shepherd.	287, Regent-street, W., and 3, Langham-chambers, W.

The following Institution has been received into Union since the last announcement :—

Greville House (Pinlico) Working Men's Library and Reading-room.

The Paper read was—

ON THE ECONOMIC APPLICATIONS OF SEAWEED.

By EDWARD C. C. STANFORD, F.C.S.

Sixty years ago it would have been difficult to persuade a botanist to include one of the Marine Algae in his herbarium, so worthless and insignificant were they then esteemed; now they are numbered amongst the choicest dried collections from the vegetable kingdom. The seaside loving public, who seek health and relaxation in marine breezes have ample opportunities of seeing them in the freshness of life, and of watching their growth in the shallow pools that are left by the receding tide on our coasts; and we have all become familiar with their diversity of colour and delicate beauty. They have now so many admirers, and have become so popular, that it is unnecessary for me to speak in their praise; in fact, I intend in this paper to be a thorough utilitarian, and to view them only in their practical applications. But as the beauty of the algae has been despised, so their utility appears to have been generally discredited. The Latin poets gave alga the prefix of "inutilis;" and Dr. Johnson has been often quoted, perhaps rather unfairly, as having included them in his "plants that are noxious and useless."

The first important application of seaweeds was made about the middle of the last century, it consisted in burning them for the ash, as a source of soda; but barilla from abroad entered our market, and the tall chimney of the alkali works rose up in competition against them, and seaweeds were again at a discount. Then the discovery of iodine was made, and the burning of seaweeds became a necessity; and even now we are mainly indebted to this humble source for the means we possess of borrowing the sun's light to paint his own image. We claim seaweed as the raw material which has enabled the photographers of our day to satisfy hundreds of thousands of our countrymen who have longed to preserve the likeness of the illustrious deceased, whose sudden call to another crown has plunged the whole nation in sorrow and mourning. Nevertheless, it must be admitted that the chemistry of seaweed has been but imperfectly studied, and by far the greater part of the rich wreck of marine vegetation annually deposited on our island shores remains unappropriated.

I shall first review the various applications of seaweed at present made, and then proceed to point out the best method of bringing our marine harvest to the national

barn. I must premise here that under the collective term Seaweed I include all plants growing in the sea and thrown up on the shore, as I shall have to speak of one that is not a true alga. The present principal economic applications of seaweeds are—as food or medicine; as manure; and in the manufacture of kelp; under these three heads I shall consider them, noticing also a few other suggested uses, retrospective and prospective.

SEAWEED AS FOOD OR MEDICINE.—The applications of the algae in this way are very limited, particularly in this country. I shall merely briefly enumerate the principal species employed, and their uses, as an excellent paper on this part of my subject, by Mr. P. L. Simmonds, has already appeared in this Society's *Journal*, Vol. V., p. 362, and to this, and another by Dr. Macgowan, I refer those who are desirous of further information, as I am unable to add anything to them. The algae possess nutritious and demulcent properties; they contain a peculiar gum, and sugar, starch, a little albumen, and a comparatively large proportion of nitrogen.

Laminaria digitata—Tangle, or sea-girdles; the fronds are occasionally eaten when young. The frond of this species no doubt constitutes the gôitre-leaf, chewed in the Himalayas, the whole plant abounding in iodine and potash, the important chemical remedies for gôitre. The stems of this plant make excellent handles for knives, files, &c., if the blade be inserted when the stem is fresh cut, and the weed then allowed to dry, it contracts, holding the blade with great firmness, and presenting a brown wrinkled appearance something like buck-horn. The handle, when varnished, is very durable, and this application is not followed to the extent its value would warrant.

Laminaria saccharina—Sweet tangle, called sea-tape in China, where it is eaten. This plant has been found by Dr. Stenhouse to be very rich in mannite—a peculiar unfermentable crystalline sugar, obtained usually from manna; and occurring also in the lilac and privet, plants belonging to the same natural order (*Oleaceæ*) as the manna ash—*Fraxinus rotundifolia*. This sugar contains $C_{12}H_{14}O_{12}$, and is formed also when ordinary cane sugar is submitted to lactic fermentation. It has no commercial application. This seaweed contains it in the proportion of 12 to 15 per cent., and if there existed a demand for it, mannite could be advantageously prepared from this source. It may be generally seen on the dry frond as an efflorescence. Dr. Stenhouse has found that *Halidrys siliquosa* contains 5 to 6 per cent. *L. digitata*, the *Fuci*, *Alaria esculenta*, and *Rhodomenia palmata*, and probably many others, also contain it.

Laminaria potatoesum, under the name of bull kelp, is largely eaten in New Zealand and Van Dieman's Land, and is considered very fattening.

Fucus vesiculosus, bladder wrack, lady wrack, *quercus marina*, or black tang, is, according to Linnæus, used in Gothland, under the name of swine tang, boiled and mixed with flour, for feeding hogs. It is employed as winter food for cattle and sheep in the Western Hebrides. I have seen cattle in the Isle of Lewis eat it with evident relish, and they appear to thrive well on it. It has been much employed externally as a friction in glandular enlargements, and by Dr. Russell the juice has been given internally with advantage in the same complaint. Carbonized in a closed crucible, it constitutes the *Æthiops vegetabilis*, formerly used in scrofula.

Porphyra laciniata is pickled with salt, and sold in London as laver. It is stewed as a luxury in England and Scotland, and under the name of sloke in Ireland. It is also a good alterative medicine, and has been recommended by Professor Hervey (Phycolog. Britt.) as a valuable diet, in the absence of other vegetables, to our whaling crews sailing in high latitudes, where every rock at half-tide produces it. The London market is supplied from Devonshire.

P. vulgaris is eaten in China as a relish with rice, under the name of Tsz-Tsai (purple vegetable).

Ulva latissima, oyster green, or green laver, or sloke, is much inferior to the porphyra, but is used in the same manner.

Rhodomenia palmata, dulse, dillish, dulling or water-leaf, has an odour of violets, and a slightly acid taste. The dried plant was formerly much chewed in Scotland and Ireland, but is now superseded by tobacco. Dulse and tangle were at one time commonly hawked in the streets of Edinburgh and Glasgow. It is eaten in Iceland and in the islands of the Archipelago; it is a favourite ingredient in ragouts, to which it imparts a red colour and thick consistence. It has sudorific properties, and is employed for these in the Isle of Skye. A fermented liquor is made of it in Kamschatka.

Laurencia pinnatifida, pepper dulse, has pungent properties, and is occasionally used as a condiment in Scotland. It is also chewed in Iceland.

Iridaea edulis, called dulse in the south-west of England, where it is eaten by the fishermen after pinching it between hot irons; thus cooked it is said to taste like roasted oysters.

Alaria esculenta, bladder-locks, edible fucus, or hen-ware, is eaten in Ireland, under the name of murlins; it is also eaten in Scotland and Iceland.

Plocaria helminthocortos, Corsican moss, has been in use amongst the natives of Corsica as an anthelmintic for several centuries.

Durvillaea utilis, used as an article of food in Valparaiso, and by the poorer inhabitants on the west coast of South America. I am indebted to Mr. M. C. Cooke for a fine specimen of this species.

Eucheuma speciosum and *Gigartina speciosa*, are edible seaweeds, eaten in Australia.

Sargassum bacciferum is the celebrated gulf weed of the Atlantic; the stems are said to constitute the goitre-sticks chewed in South America when that disease is prevalent; it is more probable, however, that the stems of the *Laminaria digitata* furnish these.

Chondrus crispus and *C. mamillosus*, Irish or Carrageen moss. These afford demulcent and nutritive jellies, and of all algæ are the most used in England for food and medicine; the market supply is obtained from Clare and the west coast of Ireland. The plant is sometimes employed in Ireland as a substitute for size. The *C. crispus* contains 79 per cent. of a peculiar gelatinous principle, called carrageenin; it differs from ordinary gum in not being precipitated by alcohol, from gelatine by affording no reaction with tincture of galls, and from starch jelly by giving no blue colour with tincture of iodine. It is precipitated by alcohol, acetate of lead, and infusion of galls, and converted into grape sugar by boiling with dilute sulphuric acid. It contains $C_{12}H_{10}O_{10}$ according to Schmidt, and $C_{24}H_{19}O_{19}$ according to Mulder. It is employed in pulmonary complaints, and in making bandoline.

Gelidium corneum. This plant is the algæ de Java, which is made into an iced jelly, and sold in Ningpo, under the name of niu-mau (ox hair vegetable). It has lately been made the subject of an important discovery by M. Payen (*Rep. de Pharm.*, Jan., 1860). He has extracted from it 27 per cent. of a peculiar principle, which he terms gelose, having ten times the gelatinizing power of the best isinglass. With the same reactions as carrageenin, it differs from it in its wonderful gelatinizing power. I am indebted to the kindness of Mr. Daniel Hanbury for the very fine specimen of crude gelose, imported from Japan, which I am enabled to exhibit. I recently experimented on a large number of British algæ, to ascertain if these gelatinous principles were common to many species. I was somewhat surprised to find that very few contained them, and certainly none in anything like the proportion found in the *Chondrus* and *Gelidium*. Taking the *Laminaria saccharina* as a type of the membranous species of algæ, I found it to contain, besides mannite, 34 per cent. of a gum soluble in water, and much resembling dextrine. Boiled with a mixture of equal parts of nitric acid and water,

this seaweed furnished 22 per cent. of oxalic acid, in fine crystals, probably from the decomposition of the gum. By boiling this seaweed with water, evaporating the solution, and treating the residue with spirit, the mannite is dissolved out, leaving the gum, which may be of commercial value, either as it is, or as a substitute for sugar in making oxalic acid. The mannite may be crystallized from the spirituous solution.

The following algæ are also largely imported from the islands of the Indian Archipelago to China and Japan, for the manufacture of gelatinous compounds; they probably all contain carrageenin, or gelose, in large quantity. The most important is the *Plocaria candida*; this plant, called agar-agar by the Malays, and bulung at Java, is also imported into this country as commercial Ceylon moss. (The *Fucus spinosus* has been imported under the same name.) It has several synonyms, *Gracilaria lichenoides*, *Spharococcus lichenoides*, *Gigartina lichenoides*, &c. The edible bird's-nests, esteemed as a delicacy in China, are probably constructed from this weed by a species of swallow—the *Hirundo esculenta*. It is said by Mr. Craufurd to form part of the cargo of every junk leaving the Archipelago, and the price on the spot is stated at from 5s. 8d. to 7s. 6d. per cwt. Though used largely as a food it is also employed as the best material for varnishing the Chinese lanterns.

Laurencia papillosa—tan-shwui—this, as well as the *Gelidium corneum*, is used in the preparation of tang-tsai, or Chinese moss.

Gracilaria crassa—Ki-tsai (hen-foot vegetable)—is cooked with soy or vinegar; and is also used as a bandoline for the hair by the Chinese ladies.

Nostoc edule is also eaten in China, and *Nostoc Arctium*, in the arctic regions.

There are many other algæ used exclusively as food by the Chinese, the botanic names of which are not known; but from the opening up of China and Japan to our countrymen, we may shortly expect much information on this subject. The Chinese are evidently the algæ-consuming nation, and there is no doubt that, in our own country, the algæ as food have been much neglected. Dr. Davy found the proportion of nitrogen in 100 parts of the dry plants to be as follows:—

<i>Laminaria digitata</i>	1.583	<i>Alaria esculenta</i>	2.424
<i>Rhodomenia palmata</i>	1.656	<i>Chondrus crispus</i>	2.500
<i>Gigartina mamillata</i>	2.198	<i>Iridaea edulis</i>	3.088
<i>Fucus vesiculosus</i>	2.397	<i>Porphyra laciniata</i>	4.650

This is a very large per centage, and equal to any of our other vegetable esculents. Researches directed especially to the algæ as food, would doubtless widely extend our present number of edible species. It may be remarked, however, that those already enumerated require much cooking and flavouring, in order to induce the national palate to acquire a taste for them; that John Bull, although so truly a man of the sea, certainly does not take kindly to an Algine diet, and there is no doubt, if it can be shown to his entire satisfaction, that a lucrative manufacture of chemical products can be conducted wherever there are seaweeds, hitherto esteemed useless, he would prefer vegetables grown in an ordinary garden, to dulse, laver, or any other such marine delicacy, particularly if the weeds can, by any means, be coined into money. It will be my aim, in this paper, to show that this is possible; but before leaving this part of my subject, I would call attention to special cases where the algæ may be very useful as food.

That scourge of our seaman, the scurvy, has been considered by many scientific men to be due to the insufficient supply of potash in the salt meat, the juice of which has diffused into the brine. The juices of limes and lemons are largely imported for its cure; if these act, as is supposed, by virtue of the potash they contain, a far better source may be found in the marine algæ. Let the most edible of these be selected for their use, and cooked as vegetables, they are well worth a trial; as they keep when dried, or may be often obtained fresh at sea, and if suc-

cessful would save large sums to the nation, at present annually expended in the juices of limes and lemons; or, if the sailors cannot be induced to acquire a relish for marine vegetables, let the chloride of potassium, prepared from them, be used with common salt in due proportion for salting their provisions, the admixture could not be detected, and there can be no doubt that such a brine would be far superior, in its effects on the meat, to that commonly employed, where we take the juice containing the potash salts out of the meat, and substitute for it a saturated solution of chloride of sodium, with occasionally a small portion of nitre.

For cattle, let the use of seaweed for food be more extensively employed; they thrive on nitrogenous roots, containing phosphate of lime and salts of potash. The algæ are strictly comparable to these, as I shall show further on, with the addition that they contain common salt, which cannot be considered a disadvantage. We know that many species are eaten by cattle with great relish, the economy of the food is obvious, and its nutritive value need not be dwelt on.

SEAWEED AS MANURE.—The value of seaweed as manure is most appreciated in the Channel Islands; the "varec" or "vraic," as the weed is there called, is considered so valuable that special laws are enforced for its regular collection and fair distribution amongst the agriculturists, many of whom use no other manure. "Point de vraic, point de haugard" ("no seaweed, no corn-yard"), has passed into a local proverb. The seaweeds are of two kinds—"vraic venant," and "vraic scié." The former is the drift weed cast up by stormy seas, on their sandy but rock bound shores; this is the most valuable, consisting chiefly of *Laminaria digitata* and *L. saccharina*, very rich in iodine and salts of potash; it is allowed to be raked up and collected all the year round, from sunrise to sunset, the time being prolonged during the winter to 8 p.m. This is the constant employment of the cottagers on the coast, both of Guernsey and Jersey, and the collection is at its height in stormy weather. The work is very laborious, the large wooden rakes used being often torn out of the hands of the "vraiqueurs" by the waves. The beautiful sandy bays which abound in these islands are the scenes of their toil. The weed is either thickly spread on the land, and ploughed in fresh with a deep plough, or dried on the beach, and burnt on the cottagers' hearths as fuel; certainly not on account of the cheerful appearance of the fire, or its pleasant odour, but because the charred ash thus produced, sells at 6d. per bushel for manure. The fire smoulders quietly; it is never extinguished, but constantly renewed, and the whitest of all smoke ascends night and day from the rude chimneys of these humble dwellings. The "vraic scié" is the "cut weed," cut off the rocks at low tide, consisting principally of *Fucus vesiculosus*, *F. serratus*, *F. nodosus*; the time of cutting it is fixed by law, at Guernsey, from July 17th to August 31st, and at Jersey twice a year, commencing March 10th and June 20th, and lasting about ten days each time. The summer cutting is made a regular holiday in both islands, and to the young "vraiqueurs" of both sexes it is an occasion of great festivity.

It is computed that about 30,000 loads of vraic of all kinds are annually obtained from the rocks and bays of Guernsey and the adjacent small island of Herm, valued at £3,000, or 2s. per load; this is a mere nominal price if the value of the potash and iodine alone be taken into consideration. The quantity of vraic collected at Jersey is, probably, quite equal to that obtained in Guernsey, but it seemed to me, during a recent visit, that the vraic used was generally not so rich, and that more is burnt and less ploughed in than at Guernsey. In one cottage I found the mother and all her family employed in drying and burning weed, composed entirely of the marine plant known as the grass wrack, *Zostera marina* (Nat. ord. Naiadaceæ) one of the poorest and most common of our seaweeds; the best front parlour was given up to its ignition—this was accompanied by an insufferable odour, which the lady

informed me was esteemed very healthy. This is a prevalent opinion amongst the peasants wherever seaweeds are burnt, and in this case I must confess that her statement was fully borne out by appearances, if I might judge by the rosy cheeks of her little assistants. She was getting the ash ready in a hurry to sow with corn on the following day, having, no doubt, the proverb before quoted weighing on her mind. The best seaweeds are stacked in Jersey; a dozen stacks of "vraic venant" thatched over, are common objects in a farm-yard, and small barns are given up to its storage when dry. The value set on vraic may be judged of by the fact that the inhabitants of Serk, having none on their island, import it in fishing boats from Herm, five miles distant; fifty Guernsey and Serk boats may be seen at once at Herm engaged in this traffic; and those who are acquainted with the precipitous nature of the rocks of Serk and its dangerous currents, will appreciate the value of vraic in that island. "Drift weed" is also largely used in Ireland, as the only manure for the potato crop; this is interesting, because the potato requires a considerable supply of potash. This alkali can hardly, however, be required in the Channel islands, as the granitic subsoil would, in disintegration, furnish it in abundance; it is probably the earthy phosphates that render the weed so fertilizing there; this is borne out by the fact that the lixiviated seaweed ash, from which the alkalis have been removed, meets with a ready sale in Guernsey, and is esteemed indeed richer, no doubt on account of the increased per centage of phosphates. The residual seaweed ash from the iodine factories in France, is highly valued as a manure, and constantly carried a distance of thirty miles from the factory. The agriculture in the western islands is also enriched by this manure, and some of the tangle is brought into Oban by fishermen in boats, and sold at 1s. per load. On the S.E. coast of Fife it is laid on the stubble at the rate of twenty cart-loads an acre, and ploughed in; the clover crop never fails, and this is a crop requiring much phosphate of magnesia, an important constituent of seaweed ash. In the Isle of Lewis twenty tons of seaweed are considered ample manure for a Scotch acre. The agricultural produce of the Isle of Thanet, in Kent, is said to have been tripled by the use of this manure, and the farms on the Lothian coasts let for twenty or thirty shillings more rent per acre, where the tenants have a right-of-way to the sea coast, where the weed is thrown ashore. In England, generally, however, seaweed is little valued by agriculturists as an actual manure, and appears to be regarded rather as an economical and useful covering to protect turnips and other roots from winter frosts. Farmers object to its bulk and expensive carriage, particularly now so many portable artificial manures are offered for sale and recommended so strongly by their manufacturers as possessing great fertilizing value in a small compass. There can be no question that many of these are worthless rubbish, and perfectly useless, except to line the pockets of the vendor; and the farmer would do well to turn his attention to the composition of seaweed ash, which really does, as I hope to prove, contain all the constituents of a good manure in a small bulk.

A process has been recommended by Dr. Stenhouse (*Philosophical Magazine*) for the manufacture of acetic acid from wet weeds by fermentation. His experiments were conducted with some of the Fuci; these were mixed with lime, and kept moist at a temperature of 90° Fahr.; he obtained by distillation with sulphuric acid an average of 1.5 per cent. of anhydrous acetic acid; it is contaminated with butyric acid. This might, however, be separated and turned to account in the manufacture of butyric ether or essence of pineapple. I have not heard of this suggestion being carried out, but it might be tried on those weeds intended for manure. In this case the best method would be to ferment them in pits with lime or chalk, at the ordinary temperature in the summer, leaving each portion in for two or three months, and supplying its place by a fresh load until the lime was saturated; the liquid would

then be pumped out, evaporated to dryness, the residue sold as crude acetate of lime, and the weed carried to the manure heap. The whole process could be crudely and economically carried on by an agriculturist near the sea.

The ashes of several fuci have been found by M. Malafati to contain silver, as well as lead and copper in minute proportion. The silver in the ash of *Fucus serratus* is estimated at $\frac{1}{10000}$ th of its weight, or about 3½ oz. to a ton. Other algæ probably contain this metal, as it has been found universally present in seawater; but, desirable as it may be to increase our stores of it, this would not be an economical source, and it is probable that the 2,000,000 tons, calculated by M. Tuld to be dissolved in sea water, might be better extracted by the copper sheathing of our ships, in which the copper is gradually replaced by the silver; the sheathing thus becomes after a time rich in silver. It has been found in the sheathing to the extent of 17 oz. in the ton.

The manufacture of paper is so important to a civilised nation, so many sources of the raw materials have been suggested, that we are not surprised to find seaweeds amongst the number. Two patents were obtained in 1855, the first dated June 20th, by Martenoli de Martinoi and others, of San Francisco, for the employment of seaweed in the manufacture of paper; and the second, dated November 29th, by Charles Maybury Archer, for the employment of seaweed in the manufacture of paper, and for the production of textile fabrics. Neither of these were proceeded with; the true algæ, in fact, having no fibres in their structure, would appear to be singularly inappropriate for the strength required in paper. Another patent was recently obtained by Ebenezer Hartnall, of Ryde, dated May 31st, 1861, for the application of the grass wrack, *Zostera marina*, to the manufacture of pulp for paper, to be used alone or in combination with other fibrous materials. This appears more practicable, as this plant is not one of the algæ, and it does contain fibre resembling the grasses. This patent, however, was not proceeded with.

Another patent was obtained in 1858, dated August 5th, by Donald M'Crummen, "for the application, use, and treatment of marine plants, heaths, or heather, and other vegetable productions, as well for the manufacture of paper as for the production of alkaline and other salts." According to his specification, the plants are crushed or bruised, and exposed to the action of boiling water or steam, until the soluble salts are removed; the insoluble residuum, after treatment with various agents of disintegration, is to be employed in the manufacture of paper, millboard, and papier maché. The solutions obtained to be evaporated to dryness to recover the salts. This is the only patent which has been proceeded with. I have received small specimens of the crude fibre, and black salt from Mr. M'Crummen, but in justice to him I am bound to state that they are sent to me as the first crude results, and he has not yet worked the process on a large scale.

THE MANUFACTURE OF KELP.—The manufacture of kelp, or the burning of seaweed to obtain its ash, was commenced about the middle of last century, and was first carried on for the value of the carbonate of soda contained in it, but when the high war duties were taken off foreign barilla and salt, kelp, for which the demand had been very great, deteriorated in value and was scarcely worth making. The carbonate of soda is never now extracted from this source; the yield was always small, and it is now obtained so cheaply from common salt. At the beginning of the present century, during the war, Highland kelp realised from £20 to £22 per ton. M'Culloch states that the kelp shores of the island of North Uist alone let for £7,000 per annum; that the Hebrides afforded 6,000 tons of kelp per annum, and the total produce of Scotland was 20,000 tons per annum, an amount which has never been manufactured since throughout Great Britain. When the duty was taken off barilla, Highland kelp fell to £3 per ton, and very little was produced. In 1812, iodine was discovered by M. Courtois, manufacturer of saltpetre, in

Paris. The discovery was announced by M. Desormes, at the meeting of the French Institute on the 19th November, 1813. The attention of the discoverer was first arrested by the destruction of his copper pans employed in the decomposition of nitrate of lime by the alkaline lye of the kelp. Having constantly observed this phenomenon, he attempted its solution, and after much patient research and many failures, he succeeded in tracing the effect to the cause and in preparing iodine in a state of purity. The manufacture of saltpetre having failed, Courtois took to the preparation of iodine as a source of profit, but in consequence of its then very limited application, the enterprise was unsuccessful, and the project was abandoned, but it was taken up afterwards by M. Tissier, at Cherbourg; this gentleman founded a large factory which is still in active operation in that neighbourhood. Although, like many inventors, Courtois gained nothing by his discovery, a late distinguished English chemist turned it to good account, and made a large sum of money by buying up all the mother liquors of the Scotch kelp works, and extracting the new body. This element, iodine, has since been found widely diffused in nature, particularly in some aluminous slates, in varieties of coal and turf, in Chili nitre, in the silver and mercury ores of Mexico, and also recently by M. Chatin, though his conclusions are doubted by some chemists, in fresh-water plants, rain water, and dew. It exists also in many mineral waters, some of which owe their medicinal effects to its presence, and in cod liver oil. Some marine animals also contain it, oysters and sponges for instance. Kelp, however, is the only commercial source for its production, and the immense value of iodine, in photography and medicine particularly, has given an impulse to the manufacture of kelp, which renders it by far the most important of all the applications of seaweed.

As at present carried on, it has many disadvantages; these are well known to chemists, but, probably from the fact that it is conducted on desolate shores, at a considerable distance from centres of civilisation, it has not yet received that attention its importance demands; it was with the view of improving this promising application that I first commenced the researches I shall have the honour of laying before the Society this evening.

The manufacture is at present limited to a few parts of Great Britain, the western and northern islands of Scotland, the north-west coast of Ireland, and Guernsey.

In the Scotch islands the weeds are collected in the summer, dried in the sun, and burned in shallow rectangular pits; the fire requires a very high temperature, and the salts enter into igneous fusion; the fused mass is broken up by throwing water on it, and the kelp thus produced is a vitreous conglomerate, in the best specimens of which the carbonised stems of *Laminaria digitata* may be distinguished. It is of this plant—called bardarrig in the "drift weed"—that the most valuable kelp is made; if unadulterated it will yield the lixiviator from 10lbs. to 15lbs. of iodine per ton. The "cut-weed" is the *Laminaria saccharina*, called "Slaten-varra," but this is mixed with several Fuci, and generally the latter predominate; the kelp produced from it does not afford more than half the iodine yielded by the former.

The kelp in the N.W. of Ireland is made principally from the "drift weed" consisting of "sea rods," as the *Laminaria* is there called; it is burnt in small heaps, and at a lower temperature; the kelp produced is, consequently, more porous, and much richer than that from the western islands. Some of the drift weed, too, is stacked in the winter for burning in the summer; a portion of the Irish kelp is made from "cut weed," principally the Fuci.

Professor Graham first directed attention to the seaweed ash of Guernsey as the richest source of iodine; this results from the fact that the *Laminaria digitata* is used, and a very low heat is employed in the production of the ash. Mr. Arnold, of Guernsey, is the only lixiviator of kelp there, and he informed me that the local government had more than

once tried to stop the lixiviation altogether, and owing to the peculiar laws of that island he is unable to carry it to any great extent. A large manufactory in one of the Channel Islands could produce immense quantities of iodine and potash, and the insoluble ash would still be retained as manure.

I am indebted to Mr. William Paterson, of Glasgow, who alone lixivates nearly four-fifths of the kelp of commerce, for the following statistics of the actual annual average amounts of kelp paid for, with the prices on the kelp shores. Those prices do not include freight and other charges incidental to the carriage of kelp to Glasgow. The average is taken on the last two years.

WESTERN ISLANDS.

1,800 tons cut weed kelp, @ £2	£3,600
800 " drift weed " @ £4	3,200
400 " " " @ £6	2,400
3,000	£9,200

ORKNEY AND SHETLAND ISLANDS.

1,200 tons drift weed kelp, @ £6	£7,200
150 " cut weed " @ £2 10s...	375
1,350	£7,575

IRELAND.

2,500 tons of drift weed kelp, @ £4 ...	£10,000
500 " " " @ £3 10s.	1,750
1,000 " " " @ £5 ...	5,000
500 " " " @ £6 ...	3,000
200 " " " @ £6 5s.	1,250
80 " " " @ £7 ...	560
1,300 " cut weed " @ £2 13s.	3,445
6,080	£25,005

TOTAL AMOUNT OF KELP, AND AVERAGE PRICE, FOR THE YEARS 1860-61.

Scotland... 4,350 tons, @ about £3 17s., valued at	£16,775
Ireland ... 6,080 " " £4 2s. "	25,005
10,430	£41,780

In round numbers, the average yield of British kelp may be taken at 10,000 tons, giving, at £4 per ton, an annual income of £40,000.

This quantity of kelp represents about 200,000 tons of wet weed, an amount which, large as it seems, is insignificant compared to the immense masses of seaweed annually deposited on the coasts of Great Britain and Ireland. The best drift weeds appear to be torn up from the Atlantic, as they are found chiefly on the western coasts in Guernsey and Jersey, the best are taken from the bays on the west coast, and the poorer sample of *vraic* I alluded to as having seen in a cottage at Jersey, was collected in St. Catherine's Bay, on the east coast. The "cut weed" is the same all round the islands. A great deal of drift weed, however, finds its way up the Channel, and is washed in and out of the numerous harbours and thrown on the flat coasts; this is particularly the case in Brading Haven, in the Isle of Wight, where it is carried in and out in large quantities. Many thousands of tons of seaweed of various kinds are deposited annually on the coasts of Sussex, but a small portion of which is utilized. Kelp is also still manufactured on the coast of Normandy in France. The weeds obtained are very similar to those of the Channel Islands.

MM. Tissier, aîné et fils, are the principal manufacturers of iodine and salts of potash in Bretagne. I have just received an important communication from these gentlemen, which furnishes me with valuable statistical information on the kelp manufacture in France. Their statements will astonish those who consider England to be in advance in this branch of industry; their position among the first and largest lixiviators of kelp, and their well-known name, are able guarantees of their ability to judge, and to speak practically, of this question. They estimate the total annual production of kelp (*sonde brute*) in

France at 25,000,000 kilogrammes; this is about 24,000 tons, or more than double the yield of the kelp shores of Great Britain. MM. Tissier alone, in their Usine de Conquet, work annually 4,000,000 to 5,000,000 kilogrammes. They have favoured me with the following interesting table of the products annually extracted from this source by the seven principal factories in France:

USINES.	Iode et Iodure de Potassium.	Brome et Bromure de Potassium.	Chlorure de Sodium.	Chlorure de Potassium.	Sulphate de Potasse.	Nitrate Potass.
	kilos.	kilos.	kilos.	kilos.	kilos.	kilos.
Le Conquet...	20,000	1,500	800,000	500,000	200,000	£200,000
Granville ...	20,000	800	800,000	...	...	1,000,000
Cherbourg ...	5,000	...	200,000	180,000	80,000	...
Montsarac ...	4,500	...	180,000	150,000	75,000	...
Pont-l'Abbé...	4,000	200	150,000	140,000	70,000	...
Portsal ...	4,000	...	150,000	140,000	65,000	...
Quatrevents...	2,500	...	100,000	90,000	50,000	...
	60,000	2,500	2,380,000	1,200,000	540,000	1,200,000

The lixiviation of British kelp is almost confined to Glasgow; a small portion only is worked in Ireland and Guernsey. There are six principal lixiviators—of these, Mr. W. Paterson is by far the largest; he works from 7,500 to 8,000 tons per annum. His enormous factory is well worthy a visit, and I am glad of an opportunity of acknowledging his attention and courtesy in showing me over it. The process usually followed is sufficiently simple; the kelp is lixiviated with water, and the solution evaporated; the sulphate of potash deposits first in small crystals, and then the chloride of sodium; these are separately collected, and the solution is then run off into iron coolers, where a crop of crystals of chloride of potassium is deposited in three or four days. This process is repeated with the mother liquor, and after the second crop of chloride of potassium has crystallised out, the mother liquor is very dark and contains sulphides; oil of vitriol is added to decompose these, and much sulphur is precipitated; this is one of the bye products of the factory. The liquor, after the addition of the oil of vitriol, is decanted from the deposited sulphur, and distilled with binoxide of manganese in leaden retorts; the iodine sublimes, and is received in earthen vessels.

This is an outline of the process generally adopted; it is simple and effective, and I can suggest no improvement; but its success is entirely dependant on the preparation of the kelp employed, and it is in the primary treatment of the seaweeds that reform is so much needed. As I shall have further to speak of the working up of seaweeds containing little iodine, I may just indicate that probably the best means of extracting it from the mother liquor of these, would be that recently discovered by MM. Stephanelli and Doveri. In their process, the liquor is evaporated to dryness, mixed with peroxide of manganese, and the iodine distilled off from earthen retorts; this saves the oil of vitriol, which is always used in Glasgow.

I propose first briefly to enumerate the disadvantages of the present method of making kelp; then to examine some suggestions for its improvement already proposed by others; and lastly, to publish my own researches on the subject, and their results.

The disadvantages of the present method are principally the following:—

1st. The high temperature developed in burning, by which much of the iodine is volatilised, and some of the potash; the loss of iodine is equal to the present yield.

2nd. The high temperature also enables the carbon to deoxidise the alkaline sulphates, reducing them to sulphites, hyposulphites, and sulphides. These become concentrated in the mother liquor, remaining after the extraction of the salts, and entailing a large expenditure of oil of vitriol for their reversion into sulphates. Dr. Wallace (in a paper read before the British Association, at

Aberdeen, September 14, 1859) estimates the cost of extracting all the salts and the iodine from kelp, at from 25s. to 28s. per ton, of which from 11s. to 13s. are expended in oil of vitriol. The importance of this disadvantage is therefore obvious; the addition of the oil of vitriol to the mother liquor sets free large volumes of sulphuretted hydrogen, a noxious gas, very difficult to get rid of, resulting from the decomposition of these sulphur compounds. To such an extent is this deoxidation carried, that kelp prepared from the *Fuci*, which are rich in sulphates, gives off sulphuretted hydrogen on simple solution in water.

3rd. The crude manner in which the weed is burned in a rough clay pit, or in heaps on the beach, the kelp thus becoming mixed with the clay, sand, or stones, which are sometimes also employed as adulterations to the extent of 50 per cent.

4th. The general neglect of the winter supply, on account of the difficulty of drying the weeds at that season. This consists principally of the deep sea algæ, torn up by storms; it occurs in the greatest quantity, and is also much the richest in iodine and potash. Yet this is almost entirely lost. Even in the summer, during a wet season, large quantities of drift weed collected by the kelpers are rotted by the rain, and rendered useless for burning; and this, says Mr. Paterson, "was the fate of many thousands of tons during the last kelp season."

5th. The entire loss of the heat produced, and the products of combustion.

6th. The dense smoke and unpleasant odour evolved in burning, banishes the kelp burner to desolate shores, and, consequently, increases the distance of the lixiviating factory; the ash in its long transit suffers much by exposure to rain; and the residuum of lixiviation, a valuable manure in the country, is a bye product in a city. It may be urged, also, that the poor kelpers in their arduous work, receive but a small part of the real value of their labour.

These evils have been frequently urged, and are universally admitted; some reforms have even been proposed. Dr. Kemp has suggested a process, which consists in selecting the stems of those algæ which are the richest in iodine, and crushing them; they are then set by in a tank for a few days, and the most soluble salts, including the iodides, extracted by cold water acidified with hydrochloric acid. The solution is then treated with chloride of lime, and the iodine thus set free precipitated by amido-acetate of lead. The cakes of weed left after pressure are dried and used as fuel, the ashes being preserved *on account of the iodine they still retain*, as well as the other salts. This process has not been adopted probably because the manipulation, down to the burning of the fuel into ashes, is a complicated labour, superadded to the ordinary process, and with little advantage, for the ashes have still to be worked for iodine and potash. The crushing of the weeds, and the drying of the crushed cakes, present great practical difficulties, which those who have had any experience in compressing fresh vegetables will fully appreciate. Dr. Wallace's suggestion in the paper before referred to is more simple, he states that it is rather given to call attention to the subject than as a perfect process. He wishes to supersede the present fused kelp by a loose charred ash. He recommends the weed to be charred rather than burnt, and, as this ash, from its bulk, would be inconvenient for carriage, it should be lixiviated with a small quantity of water, and the solution roughly evaporated to dryness. He says, "By this treatment a very pure salt would be obtained, the iodine would be wholly preserved, while the cost of working would be more than counterbalanced by the saving of vitriol that would be effected by the absence of the sulphur compounds." This idea meets some of the difficulties of the question, but not all, the saving of iodine would to a great extent be effected, it would make just the difference which now exists between the best Highland kelp and that of the Channel Islands—the former a vitreous mass, with more than half the iodine volatilised, the result of igneous fusion—the latter a loose charred ash,

the result of slow combustion, at a low temperature, and containing much more of the iodine. The difficulty, however, of completely charring on open slabs such a substance as seaweed, is considerable, and the salts resulting from its lixiviation would be coloured by any portion not thoroughly carbonized. The Guernsey kelp gives coloured solutions and dirty salts, which require recrystallisation before they can be brought into the market. It may be remarked of Dr. Wallace's suggestions, that they could not be carried out under cover, except by elaborate arrangements; on account of the offensive smoke occasioned by the products of combustion, which in his process are entirely dissipated.

My own researches were commenced by an estimation of the potash and iodine in seven of the commonest species of seaweeds; the results are shown in the following Tables:—Columns 1, 2, 3, 4, and 5, are the present kelp-bearing species. Columns 1 and 2, *Laminaria digitata* and *Laminaria saccharina* are the general constituents of "drift weed," or "vraic venant" of the Channel Islands. Columns 3, 4, and 5, the *Fucus vesiculosus*, *Fucus serratus*, and *Fucus nodosus* are generally the "cut-weed," or "vraic scié," of the Channel Islands. Columns 6 and 7, the *Zostera marina* and *Rhodomela pinastroides*, have not yet been employed in the manufacture of kelp. They are exceedingly common all round the English coast, particularly the south; the latter has received no application, the former is largely used in stuffing mattresses.

The analyses are stated so as to show at a glance the relative value of each weed for commercial purposes. The water is that driven off at 212°. The organic matter includes the charcoal and everything dissipated in burning. In the analyses of the soluble portion of the ash, the potash and sulphuric acid are stated separately, and the alkaline chlorides indicate the total amount of chlorides of potassium and sodium, supposing the two alkalies existed entirely as chlorides. This was considered the best means of stating the results for comparison. A small proportion of carbonic acid contained in some of the salts was not estimated, because practically it is not separated. The kelp is the fused ash obtained in an open porcelain crucible. The best seaweed for working commercially would be that containing the most iodine and potash, and the least sulphuric acid.

The estimations of iodine were the results of a separate set of experiments, in which the weeds were carefully carbonised in a covered porcelain crucible, at a low red heat. The iodides were dissolved from the charcoal with water, and the iodine estimated as iodide of palladium. Thus treated, the weeds were found to yield much more iodine than when burnt, even at the same temperature, in an open vessel. When thoroughly burnt, the poorer weeds gave results which could scarcely be appreciated. *Laminaria digitata* gave 19 per cent., or less than half the yield from the charcoal; 19 per cent. corresponds to 12.77 lbs. per ton of kelp, and the iodine usually obtained from the best commercial kelp made from this weed seldom exceeds this amount. Mr. Paterson, who may be considered the highest authority on this question, states the present yield of iodine from good drift weed kelp to vary from 8 to 14 lbs., but the low quality of drift weed kelp produced in the islands of North and South Uist, and the county of Donegal, does not yield him more than from 4 to 6 lbs. per ton of 22½ cwt. He accounts for the bad quality of the kelp of Uist by the large admixture of sand from the shores of those islands. It is probably also much mixed with inferior seaweeds. The statement of the amount of iodine from the *Laminaria digitata* is the average of three estimations, and to show the amount that ought to be obtained from this species, I may state that this corresponds to 32 lbs. of iodine per ton of kelp (20 cwt.) Many of the analyses of seaweeds hitherto published have been performed on different kelps, and as these always contain the ash of several species, little dependence can be placed on them as an index of the relative composition of each species. The plants here experimented on were carefully selected. The amount of

iodine will be seen to be exceedingly small in the *Fucus vesiculosus*, and kelp made from that seaweed alone would be valueless. It would yield only .99 lb per ton, but practically it always contains the ashes of others sufficient to bring it up to about 4 lbs. per ton. Sarphati estimated the iodine in this species to be .001 per cent.

I would call your attention to the large yield of potash

from that very common weed, Col. 7. The soluble ash it yields is very variable in quantity, the fronds being always more or less covered with zoophytes, which largely increase the amount of ash without adding to the soluble portion. The results given are the mean of three analyses. The potash was in all cases estimated as the double chloride of platinum and potassium.

TABLE 1.—WET SEAWEEDS, CENTESIMAL.

SPECIES.	<i>Laminaria digitata</i> .	<i>Laminaria saccharina</i> .	<i>Fucus vesiculosus</i> .	<i>Fucus serratus</i> .	<i>Fucus nodosus</i> .	<i>Zostera marina</i> .	<i>Rhodomela pinastroides</i> .
Water	82.000	81.000	71.000	78.500	58.000	82.000	83.000
Organic matter	12.710	12.920	23.280	16.220	35.030	14.720	12.878
Soluble ash	4.170	4.810	4.100	3.360	4.880	2.580	2.940
Insoluble ash	1.120	1.270	1.620	1.920	2.090	.700	1.182
Total	100.000	100.000	100.000	100.000	100.000	100.000	100.000
Yield of Kelp	5.900	6.600	7.100	6.100	7.630	3.320	6.368

TABLE 2.—DRY SEAWEEDS, CENTESIMAL.

SPECIES.	<i>Laminaria digitata</i> .	<i>Laminaria saccharina</i> .	<i>Fucus vesiculosus</i> .	<i>Fucus serratus</i> .	<i>Fucus nodosus</i> .	<i>Zostera marina</i> .	<i>Rhodomela pinastroides</i> .
Organic matter	70.112	67.646	80.358	75.079	83.412	81.796	65.748
Soluble ash	23.560	25.598	14.079	15.859	11.614	14.319	17.297
Insoluble ash	6.328	6.756	5.563	9.062	4.974	3.885	16.955
Total	100.000	100.000	100.000	100.000	100.000	100.000	100.000
Yield of Kelp	33.335	35.112	24.381	28.782	18.159	18.444	37.460

COMPOSITION OF THE SOLUBLE ASH.

Total amount of sulphuric acid.	2.135	1.627	4.165	4.620	2.927	1.498	2.619
Total amount of alkalis ex- pressed as chlorides	21.526	23.886	11.400	14.396	10.733	13.209	15.910
Total amount of potash	6.893	8.958	2.043	4.408	2.546	3.940	6.075
Total amount of iodine .....	.4788	.1583	.00985	.0382	.0422	.0457	.0378

Many have been struck by the peculiar odour evolved in burning seaweed; this at the outset of these experiments arrested my attention, and led me to examine the products evolved in combustion. For this purpose various species of algæ were dried, and submitted to a low red heat in a cast-iron retort; and the products of distillation collected in a series of large Woulff's bottles; these products were in all cases the same, differing only in quantity:—

An inflammable gas;

Water, containing carbonate and acetate of ammonia, and a kind of naphtha;

A fluid tar, containing a volatile oil, some of which also floated on the water.

A light charcoal remained in the retort; this was lixiviated with water, and treated as ordinary kelp; the solutions obtained were colourless, and the salts perfectly white and pure. The mother liquor formed a striking contrast to those usually seen; it was nearly colourless, and contained mere traces of sulphur compounds; the amount of iodine yielded was unusually large.

The products of distillation were then examined. The gas burnt exceedingly well, giving a flame of little luminosity at first, but becoming very luminous towards the end of the distillation. A portion collected at first gave 41.66 per cent. of carbonic acid. Another portion, collected towards the end of the distillation, gave only 13.3 per cent. of carbonic acid, and contained olefiant gas. The gas given off in the distillation of wet weed is also inflammable, but the flame is occasionally extinguished by the vapour of water thus simultaneously generated; a portion of this gas gave 50.84 per cent. of carbonic acid.

The condensed liquid was very alkaline; it yielded ammonia in abundance on distillation with lime. The ammonia appears to exist in the liquid as bicarbonate—crystals of this salt were found in some of the gas tubes. The chloride of ammonium in the crude state prepared by neutralising this with hydrochloric acid has an odour of picoline, an alkaloid which is also found in the volatile oil. The naphtha distilled from this liquid burns with a slightly luminous flame. Rectified over lime, its specific gravity is .826, this commences to boil at 155°; it is not a simple substance, but appears to be a mixture of acetone and methylic spirit; by repeated rectification I have succeeded in reducing the boiling point of the first portion below 140° Fahr., but I have been unable to effect any definite separation of it, either by treatment with chloride of calcium or by repeated fractional distillation. It has been found impossible to separate methylic spirit from alcohol by this means, although the boiling points of the two liquids differ by about 30° Fahr. I was not surprised, therefore, that I failed to separate the two spirits believed to be the components of this naphtha, the boiling points of which differ only 10°. The presence of acetone considerably improves its value, as a solvent of sandarac and shellac. It has also, in the crude state, a peculiar odour, from the presence in small quantity of some ethereal body, of which I have not yet obtained sufficient for examination.

The residuum in the still, after the distillation of the ammonia and naphtha, was found to be a solution of acetate of lime; distilled with hydrochloric acid, this furnished acetic acid, the last portions of which contained also butyric acid.

The tar was distilled with water, a volatile oil of very peculiar odour was thus obtained; the odour recalls that of burning seaweed. In the crude state it contains about 1·2 per cent. of the naphtha, and about 1·6 per cent. of a body analogous to kerosene. Diluted hydrochloric acid removes from it about 3·7 per cent. of a mixture of volatile alkaloids containing picoline, &c., and a red pitchy colouring matter is separated. It also contains pyrrhol. After purification with oil of vitriol and caustic soda, the oil presents the appearance and properties of a mixture of pure hydrocarbons analogous to those from coal-tar naphtha. Its sp. gr. is ·841, and its boiling point rises from about 180° to above 400° Fahr. This oil must not be confounded with that obtained by Dr. Stenhouse, in distilling some species of *Fucus* with sulphuric acid, and named by him fucosol, and from which he prepared fucosamide and fucosine. The oil here treated of is a pure hydrocarbon, and has not been hitherto obtained from this source. It will be applicable to many of the uses for which coal-tar naphtha is so much in demand. The colouring matter separated by an acid from the oil is a product of decomposition. It is soluble in oil of vitriol, glacial acetic acid, alcohol, and methylic spirit. It is insoluble in water, either cold or boiling, and separated from all its solutions by its addition; it is also insoluble in chloroform, ether, benzole, bisulphide of carbon, oil of turpentine, the fixed oils, and dilute acids. It is unaffected by boiling hydrochloric acid. Nitric acid has no effect on it in the cold, but decomposes it when boiling, forming oxalic acid. Boiling oil of vitriol carbonizes it. It is decolourised by chlorine. The caustic alkalies partially decolourise, but do not dissolve it; the colour is restored by an acid. It is, however, chiefly remarkable in containing iodine, and it holds it in such close combination that boiling solution of potash does not remove it, and it is only when fused with hydrate of potash that it can be detected. It is thus converted into oxalate of potash and iodide of potassium; it was found to contain ·35 per cent. of iodine. I do not anticipate that it will be valuable as a dye, as it shows a tendency to fade; in a chemical point of view I look forward with interest to its thorough examination when I shall have obtained it in sufficient quantity; the greater

the heat employed in distilling the weed, the more of this substance is produced. The tar, after the volatile oil had been removed, presented the appearance of Stockholm tar, which it might well replace; it was then distilled alone, and a fixed oil thus separated; this contains on an average 5·2 per cent. of a crude acid, analogous to kerosene. The oil, after this has been removed by potash, is purified with oil of vitriol, and it then resembles the paraffin oil of commerce. It will thus be seen that all these products are of considerable commercial value, and it remains now to show what are the quantities yielded—the same species were experimented on for this purpose—the weeds were compressed into cakes, and distilled in a small iron gas retort—the quantitative results are shown in the following tables.

The tar is that left after distilling in the presence of water. The volatile oil, having thus been removed, is stated separately, its weight being included in the aqueous portion. The paraffin oil is distilled from this tar; the paraffin in it was not estimated. The pitch left behind in the distillation was not weighed. The naphtha, volatile oil, and paraffin oil were in all cases measured, as (in the crude state) impurities tell more on the weight than on the measure.

The *Fucus nodosus*, No. 5, I could not obtain in sufficient quantity for distillation. The ammonia, tar, and oils were estimated in a tube experiment on the small scale. The measures of gas in all the tables are only approximative. A portion of the iodine is found among the products of distillation, and that is expressed in the tables as volatile iodine.

The products obtained from the residual charcoal are also shown in the tables, the alkalies, for convenience, being expressed as chlorides. The pure charcoal is the total amount of pure carbon yielded, and shows the value of each weed for heating purposes. The ash is pure, containing 20 per cent. of earthy phosphates; unadulterated kelp, as usually obtained, contains about double the quantity of ash there stated, the difference being unconsumed carbon; as, however, it contains the same amount of phosphates, it would be worth no more than the quantity here indicated.

TABLE 3.—PRODUCTS OBTAINED BY THE DESTRUCTIVE DISTILLATION OF DRY SEAWEEDS, CENTESIMAL.

SPECIES.	<i>Laminaria digitata</i> .	<i>Laminaria saccharina</i> .	<i>Fucus vesiculosus</i> .	<i>Fucus serratus</i> .	<i>Fucus nodosus</i> .	<i>Zostera marina</i> .	<i>Rhodomela pinastroides</i> .
Charcoal, including ash	43·750	47·040	38·040	45·450	35·166	43·272	56·610
Tar	1·861	2·123	3·835	2·474	3·116	·805	1·078
Aqueous portion	24·509	27·151	31·988	24·978	24·434	25·341	29·931
Gas	29·880	23·686	26·137	27·098	37·284	30·582	12·381
Total.....	100·000	100·000	100·000	100·000	100·000	100·000	100·000

PRODUCTS FROM THE WATER AND TAR.

Volatile oil	·707	·708	·989	·825	not estimated.	·312	·319
Paraffin oil	·698	·796	1·438	·928	1·168	·302	·404
Naphtha	·450	·427	·616	·315	not estimated.	·355	·480
Ammonia, or as	·609	·965	·736	·862	·929	·537	·611
Sulphate of ammonia	2·362	3·713	2·794	3·348	3·606	2·086	2·373
Acetic acid, or as	·194	·245	·620	·652	} not estimated.	·181	·272
Acetate of lime	·259	·326	·816	·469		·241	·363
Colouring matter.....	·041	·093	·127	·077		·028	·029
Volatile iodine	·00724	·007039	not estimated.	·003128	} not estimated, not estimated.		

PRODUCTS FROM THE CHARCOAL.

Pure charcoal	13·862	14·695	18·398	20·529	18·578	25·068	22·358
Chloride of potassium	10·831	14·104	3·216	6·940	4·008	6·203	9·693
Chloride of sodium	10·695	9·782	8·184	7·456	6·725	7·006	6·217
Insoluble ash	6·328	6·756	5·563	9·062	4·974	3·885	16·955
Iodine	·4788	·1582	·00985	·0382	·0422	·0457	·0378

TABLE 4.—PRODUCTS OBTAINED BY THE DESTRUCTIVE DISTILLATION OF DRY SEAWEEDS, PER TON.

SPECIES.	<i>Laminaria digitata.</i>	<i>Laminaria saccharina.</i>	<i>Fucus vesiculosus.</i>	<i>Fucus serratus.</i>	<i>Fucus nodosus.</i>	<i>Zostera marina.</i>	<i>Rhodomela pinastroides.</i>
Charcoal, including ash	Cwt. lbs. 8 84	Cwt. lbs. 9 46	Cwt. lbs. 7 68	Cwt. lbs. 9 10	Cwt. lbs. 7 4	Cwt. lbs. 8 73	Cwt. lbs. 11 36
Tar	41·8 lbs.	47·5 lbs.	86 lbs.	55·4 lbs.	69·8 lbs.	18 lbs.	24·1 lbs.
Aqueous portion	55 galls.	61 galls.	72 galls.	56 galls.	54 galls.	57 galls.	67 galls.
Gas (approximative)	1,205 c. ft.	956 c. ft.	1,052 c. ft.	1,089 c. ft.	1,504 c. ft.	1,234 c. ft.	500 c. ft.

PRODUCTS FROM THE WATER AND TAR.

Volatile oil	253·4 oz.	253·7 oz.	354·5 oz.	295·7 oz.	not estimated.	111·8 oz.	114·3 oz.
Paraffin oil	250·2 oz.	285·3 oz.	515·4 oz.	332·6 oz.	418·6 oz.	108·2 oz.	144·8 oz.
Naphtha	161·3 oz.	153 oz.	220·8 oz.	112·9 oz.	not estimated.	127·2 oz.	172 oz.
Sulphate of Ammonia	52·9 lbs.	83·2 lbs.	62·6 lbs.	75 lbs.	80·8 lbs.	46·7 lbs.	53·2 lbs.
Acetate of lime	5·8 lbs.	7·3 lbs.	18·3 lbs.	10·5 lbs.	} not estimated.	5·4 lb.	8·3 lbs.
Colouring matter	·92 lb.	2 lbs.	2·8 lbs.	1·7 lbs.		·63 lbs.	·65 lb.
Volatile iodine	·1622 lb.	·1576 lb.	not estimated.	·07007 lb.		not estimated.	not estimated

PRODUCTS FROM THE CHARCOAL.

Pure charcoal	Cwt. lbs. 2 86	Cwt. lbs. 2 105	Cwt. lbs. 3 76	Cwt. lbs. 4 12	Cwt. lbs. 3 80	Cwt. lbs. 5 7	Cwt. lbs. 4 52
Chloride of potassium	2 19	2 92	0 72	1 43	0 90	1 27	1 105
Chloride of sodium	2 15	1 107	1 71	1 55	1 38	1 44	1 27
Insoluble ash	1 30	1 39	1 13	1 91	0 111	0 87	3 43
Iodine	10·72	3·54	·221	·856	·645	1·024	·847

The following table is constructed to show the great loss of valuable products in the present manufacture of kelp. The quantity of iodine estimated as lost is approximative, as it is impossible exactly to calculate it, but I believe it to be here rather under than over-stated.

The actual difference I found in the *Laminaria digitata* is shown in the first column. The amount of chloride of potassium stated as obtained is above the actual yield on the large scale, as part exists as sulphate, and much is driven off by the high temperature of the kelp fires.

TABLE 5.—PRODUCTS NOW OBTAINED FROM A TON OF KELP, AND THOSE WHICH WOULD BE ADDED BY THE NEW PROCESS OF MANUFACTURE.

SPECIES.	<i>Laminaria digitata.</i>	<i>Laminaria saccharina.</i>	<i>Fucus vesiculosus.</i>	<i>Fucus serratus.</i>	<i>Fucus nodosus.</i>	Average.
	cwt. lbs.	cwt. lbs.	cwt. lbs.	cwt. lbs.	cwt. lbs.	cwt. lbs.
Chloride potassium ...	6 56	8 20	2 72	4 96	4 46	5 35
Chloride sodium	6 45	5 53	6 78	5 24	7 41	6 25
Insoluble ash	3 89	3 103	4 63	6 38	5 53	4 92
Iodine	0 12·77	...	...	...	...	0 5
ADDED BY THE NEW PROCESS.						
Volatile oil	4½ galls.	4½ galls.	9½ galls.	6½ galls.	not estimated.	6½ galls.
Paraffin oil	4½ galls.	5½ galls.	15½ galls.	7½ galls.	14½ galls.	9 galls.
Naphtha	3 galls.	2½ galls.	5½ galls.	2½ galls.	not estimated.	3½ galls.
Sulphate of ammonia. 1 cwt. 46 lbs.	2 cwt. 17½ lbs.	2 cwt. 32½ lbs.	2 cwt. 38½ lbs.	3 cwt. 108½ lbs.	2 cwt. 48 lbs.	2 cwt. 48 lbs.
Acetate of lime	17½ lbs.	21 lbs.	75 lbs.	36½ lbs.	} not	37 lbs.
Colouring matter	2½ lbs.	5½ lbs.	11½ lbs.	6 lbs.	} estimated.	6½ lbs.
Pure charcoal	8 cwt. 35½ lbs.	8 cwt. 59 lbs.	15 cwt. 10 lbs.	14 cwt. 41 lbs.	20 cwt. 49 lbs.	13 cwt. 39 lbs.
Gas (approx.)	3615 c. ft.	2771 c. ft.	4313 c. ft.	3811 c. ft.	8272 c. ft.	4456 c. ft.
Iodine	19·39 lbs.	...	...	...	...	5 lbs.

Table 6 shows the comparison of seaweed with peat in the products of destructive distillation. Peat is worked with profit in the Hebrides, and largely on the Continent, for these alone; the ash is valueless. The peat results in the table are taken from valuations by Messrs. Kane and Sullivan, for the Irish Peat Company. It will be seen that, in the products of distillation alone, the advantage is considerably on the side of the seaweed, while the lixiviation of the seaweed ash is already a lucrative manufacture, and its value will by this process of distillation be much increased.

A glance at table 6 will show the insignificant value of peat compared with seaweed.

These analyses conclusively prove that the present method of manufacturing kelp is an exceedingly wasteful one; for not only are the constituents of the ash

largely dissipated, but these valuable products of distillation are all volatilised into the air; and taking, as a rough calculation 10,000 tons to be the annual yield of kelp, we have the following quantities annually disposed of in this manner:—

Volatile oil	62,500 galls.
Fixed oil	90,000 "
Naphtha	34,000 "
Ammonia:—	
(Calculated as sulphate)	1,216 tons.
Acetic Acid:—	
(Calculated as acetate of lime)	167 "
Pure carbon	6,674 "
Colouring matter	29 "
Gas	45,560,000 cubic ft.
Iodine	50,000 lbs.

TABLE 6.—PRODUCTS OBTAINED IN THE DESTRUCTIVE DISTILLATION OF DRY SEAWEEDS, COMPARED WITH THOSE AT PRESENT OBTAINED IN THE DESTRUCTIVE DISTILLATION OF PEAT.

	AVERAGE YIELD OF SEAWEED.		AVERAGE YIELD OF PEAT.	
	Present Kelp-bearing Species, Nos. 1, 2, 3, 4, & 5.		By Kane and Sullivan.	
	Per Ton.	Per 100 Tons.	Per Ton.	Per 100 Tons.
Volatile oil	289·3 oz.	18½ galls.	320 oz.	200 galls.
Paraffin oil	360·4 oz.	225 galls.	157·7 oz.	98·6 galls.
Naphtha	162 oz.	102 galls.	66·3 oz.	42 galls.
Sulphate of ammonia	70·9 lbs.	3 tons 3 cwt. 34 lbs.	22·4 lbs.	1 ton.
Acetate of lime	10·5 lbs.	9 cwt 42 lbs.	6·8 lbs.	6 cwt. 8 lbs.
Pure charcoal	3 cwt. 49½ lbs.	17 tons 4 cwt. 22½ lbs.	4 cwt. 103 lbs.	24 tons 11 cwt. 108 lbs.
Gas, approximative	1,161 c. feet.	116,100 c. ft.	1,475 c. feet.	147,500 c. ft.
Colouring matter	1·85 lbs.	1 cwt. 73 lbs.	...	...
Chloride of potassium	1 cwt. 63 lbs.	7 tons 16 cwt. 28 lbs.	...	...
Chloride of sodium	1 cwt. 79½ lbs.	8 tons 10 cwt. 110 lbs.	Valueless.	Valueless.
Insoluble ash	1 cwt. 34½ lbs.	6 tons 10 cwt. 90 lbs.	103 lbs.	4 tons 11 cwt. 108 lbs.
Iodine	3·26 lbs.	326 lbs.	...	...
Paraffin	Not estimated.	Not estimated.	3½ lbs.	300 lbs.

I leave commercial men to affix the values to these products (referred to in the preceding page as annually lost), and then weigh the amount against the £40,000 at present paid for the residuum of this waste. Can we wonder that the kelper works in rags? Can we be surprised that his operations are confined to desolate sea shores? Or is it astonishing that the kelp districts bring little revenue to their proprietors—that the tenants pay little or no rent, when they thus throw half their harvest away? It is difficult for those who have not visited these coasts to form an idea of the vast accumulations of seaweed thrown up in the winter, yet these, universally admitted to be the most valuable, are all lost. Is it possible that the utilitarian spirit of the age will permit this enormous waste to continue? Unless the lairds of the kelp districts take the subject up themselves it will still be so, for they cannot expect their poor tenants to erect works for this purpose, as the lion's share of the advantage must ultimately fall to their own lot. With the view of interesting them in the subject, I beg to call attention to the following proposed improvements:—

1. Seaweeds of all kinds are to be stored in sheds; they keep perfectly well under cover; they should be first collected in heaps, to drain off the superficial water, and then laid out in drying sheds; in summer, advantage may be taken of the sun's rays. Seaweeds, when laid out thin, are not so difficult to dry as is generally supposed, and when dry keep perfectly well under cover.

2. The seaweeds thus dried are then to be compressed into cakes, by hydraulic or other pressure; this is not essential, but the cakes occupy less room in stowage, and if the charcoal obtained is to be used for fuel, this treatment improves it.

3. The cakes, or the unpressed weed, are then to be distilled at a low red heat, in iron retorts; the tar and aqueous products to be collected in suitable condensers, and the gas in a gasometer. The gas may be employed for heating the stills used for rectifying the products, for heating the drying sheds, or even for lighting the factory; it might even be treated according to Pettenkofer's method of superheating, and used as a means of lighting a district. The best kind of retort for the purpose will, I think, be cylindrical vessels of wrought iron, heated externally, and placed vertically, having the base and also the upper end conical; the former furnished with an airtight iron damper plate, for withdrawing the charge when the carbonization is complete, and the latter provided with a moveable iron hopper for introducing the charge.

4. The charcoal is to be lixiviated and treated as ordinary kelp, and then thrown out in heaps to dry in the air. When raked from the retorts it should be allowed to fall into the lixiviating water, or into iron boxes, to protect it from the air; if the latter plan be adopted their heat may be rendered available for drying the weeds by wheeling

them into the drying shed. The lixiviation will require larger tanks for its conduction than those at present employed, on account of the greater bulk of the charcoal; it has the advantage, however, of floating on water, and as the water in contact with it, when saturated, sinks to the bottom, it is quickly replaced by a fresh portion, and the solution is thus rapidly effected. The solution would be roughly evaporated to dryness, and the salt thus obtained sold to the lixiviator.

5. The washed and air-dried charcoal is to be used for heating the retorts and evaporating the solutions of the salts. Should, however, peat be very abundant in the neighbourhood this charcoal may be manufactured into manure, by treating it with the ammoniacal liquid; or be applied to some of the many uses for charcoal, and the peat employed as the fuel. The ash from the charcoal is a valuable manure; it usually contains over 20 per cent. of earthy phosphates. A few samples I have examined gave me the following results:—

	Laminaria digitata.	Laminaria saccharina.	Highland Kelp.	Zostera marina.
Phosphates of lime and magnesia.....	24·16	18·50	22·83	15·90
Carbonates of lime and magnesia.....	16·10	20·11	18·38	16·37
Sand, &c.	56·76	57·78	56·56	65·36
Charcoal	2·98	3·61	2·23	2·37
	100·00	100·00	100·00	100·00

The phosphates of magnesia predominate, and these are partially soluble in water. The proportion of phosphate is about that in Peruvian guano, and if the crude ammoniacal salt obtained by distillation were added in the proportion of about 40 per cent., a manure would be obtained worth from £10 to £12 per ton, of which from 3 cwt. to 4 cwt. would be sufficient for an acre of land. The phosphate of magnesia it contains points to its special application to beet-root and clover. Mixed with about 5 per cent. of the chlorides of potassium and sodium, it would be equally beneficial to other root and cereal crops. Liebig divides crops, according to their wants, into three classes—potash plants, lime plants, and silica plants; such a manure contains the food for all or either of these.

6. The products of distillation I recommend to be treated as follows:—The tar is syphoned off, and distilled with an equal measure of water in an iron tar still; the light volatile oil passes over with the condensed water, on which it floats. This is decanted, and treated with dilute sulphuric acid, which removes picoline and other oily bases, and the red colouring matter is deposited. This substance is washed and dissolved in spirit, and the solution deposits it on evaporation. The light oil is then agitated with from 5 to 10 per cent. of oil of vitriol, washed with water and caustic soda, and finally re-distilled. The residual tar,

from which the light oil has been removed, is then pumped into another iron still, and a stronger heat applied. The paraffin oil is thus obtained, and purified by oil of vitriol, caustic soda, and re-distillation. The residual pitch may be employed for the manufacture of patent fuel, &c., or pumped while hot into brick ovens provided with an iron pipe to carry off the heavy vapours, and subjected to a red heat, by which a further portion of paraffin oil is obtained, and a good coke left in the still, commercially valuable to ironfounders on account of its freedom from sulphur. The liquid in the condensers, being separated from the tar, which sinks to the bottom, is mixed with excess of lime, and distilled in a capacious iron still provided with a suitable condenser. Ammonia and naphtha pass over, and are received into hydrochloric acid. The solution of acetate of lime remaining in the still is run out, evaporated to dryness, and the black, impure acetate thus obtained purified by charring, re-crystallisation, distillation, or conversion into acetate of soda. The ammoniacal distillate which has been neutralised by hydrochloric acid is re-distilled till the specific gravity of the distillate rises nearly to that of water. This is best distilled by the agency of steam. The first portion which comes over is the naphtha; this is collected separately, the weaker liquor subsequently distilled being returned to the still with the next charge. Redistillation over quick lime yields it in a state of purity. The solution of chloride of ammonium remaining in the still is run out, evaporated, crystallised, and the crystals sublimed according to the ordinary method of making sal ammoniac of commerce.

This, then, is the process, and it offers the following advantages:—

1. Retention of the whole of the iodine.
2. Easy and rapid lixiviation, colourless solutions and pure salts.
3. Absence of sulphur compounds in the mother liquor, great saving of oil of vitriol, and no evolution of poisonous gases.
4. Factory to a great extent self-supporting, having its own means of heat and light, the fuel being extracted from the weed itself.
5. Manufacture continuous, affording employment to the kelpers all the year round, and at a higher rate of remuneration.
6. Extension of the manufacture, as this process allows a much larger margin for profit, and admits of the lucrative working of the commonest weeds, which will not, I anticipate, be allowed to rot on the shores of Great Britain when their commercial value becomes known.

These then are the principal features and advantages of this process; no doubt improvements may be developed in its minor details when it is worked on a large scale, but its general plan I believe to be the desideratum. If it be advisable that the ash should be sold for lixiviation to replace the kelp of commerce, it may be made more portable by raking the charcoal out into the air, when it gently consumes at a low temperature, and forms a loose ash containing very little carbon; the charcoal would thus be sacrificed, though an arrangement could easily be made by which it might be allowed to fall into an open chamber under the drying shed, and its heat of combustion thus made available. This might be adopted with poor weeds, such as the grass wrack, which are largely mixed with sand; but all those employed in the present manufacture of kelp should, I think, be treated as I have recommended. I have also tried distillation in a blast of air, but although the products obtained are nearly the same, the temperature is so liable to rise with the attendant evils alluded to, that I prefer the method I have indicated. Theories have been circulated amongst scientific men to show that the weeds on the Irish and Scotch western coasts only contain iodine in quantity, because they are nourished by the Gulf Stream, which impinges on these coasts, and is considered to be the carrier of iodine from the Gulf of Mexico. My experiments have

led me to the conviction that iodine is pretty universally distributed in sea-water; that a large proportion of iodine is confined to a very few species of algae, though nearly all contain traces; and that those species contain the same proportion wherever they may be found, but differing for each species and the way in which they are burnt. Thus, the weeds on which my experiments were conducted were all collected on the south coast of England, where they have been supposed to contain no iodine. Reference to my analysis will afford a conviction to the contrary. There are many seaweeds, however, which contain little iodine, but are well worth working for potash; thus grass wrack contains 15 per cent. in the ash, and *Rhodomela pinastroides* 16 per cent., and these have never been worked. The extraction of chloride of potassium from seaweed is not sufficiently thought of, as it is now one of our principal sources of saltpetre, on which so much depends in time of war; this is now made very largely, by the decomposition of nitrate of soda by chloride of potassium. Considering, then, the great value of seaweeds, as a source of potash, and as the only available source for that very valuable element iodine, it is not a question as to whether they should or should not be worked, but it is an absolute commercial necessity that the iodine and potash should be extracted from them; and the question is, what is the best method of doing it?

It is a remarkable fact that the principal commercial sources of ammonia are carbonised plants, in the shape of coal; and that these plants were mostly cryptogamic, and very near the algae in the botanical scale; the present century has developed a source of unbounded national wealth in the former, and I believe that a great future is open to the latter. We reckon a country's riches not so much by its gold and silver as by the coal it is enabled to produce and consume; and although we do not now believe in the transmutation of metals, and we have desisted from our ancestor's fruitless searches for the philosopher's stone, the spirit of alchemy is still amongst us, and it presides over the extraction of valuable products from cheap and apparently useless materials. Seaweeds have been regarded in the latter class, and these researches will I hope be the means of directing attention to their intrinsic value.

My process has been patented in England and France, and I bring it before the Society of Arts because I am anxious to have it thoroughly discussed and criticised by the able men around me. If it passes that ordeal in a satisfactory manner I shall feel justified in urging the improvements on owners of kelp estates; and if I am not too sanguine in my expectations, a great reform will be introduced into, and a largely increased income will be derived from, the kelp-bearing districts of Scotland and Ireland, the social state of their inhabitants will be greatly ameliorated; and even in wealthy England, "Alga inutilis est," will be no longer a proverb.

DISCUSSION.

The CHAIRMAN said Mr. Stanford's paper contained so much matter that was interesting to the meeting, that he was sure many members present would take occasion to favour them with remarks on the subject. It was certainly wonderful that so small a portion of the valuable substances which these marine plants contained had as yet been turned to account.

Mr. T. N. R. MORSON could not help feeling that this Society was deeply indebted to Mr. Stanford for the very admirable paper he had brought before them—a paper which embodied a mass of facts and observations which they would search for in vain elsewhere. Mr. Stanford must have devoted an immense amount of time and attention to collect and bring before them all the matter embraced in the paper which they had had the pleasure of hearing. The subject of iodine was one which possessed a great degree of interest in this country, for it was a material of considerable commercial importance. It was, he

believed, originally introduced at the enormously high price of £1 per ounce; it was afterwards sold by Dr. Ure at 7s. 6d. per ounce, since which it had declined to about 4d. per ounce, and the main advantage which had been derived to the manufacturers of kelp, had been from the potash salts which the seaweed contained. He believed no other person than the author had thought of employing distillation for the purpose of collecting other products, but he had no doubt, when this paper became known, attention would be called to the advantages of employing distillation, both in collecting those other products, and in increasing the amount of iodine obtained from these substances. He was sure they must all feel indebted to Mr. Stanford for this admirable paper, which he thought would have considerable effect upon the commerce of seaweed throughout the whole coast, so that the algæ would be much more largely employed than hitherto.

Mr. P. L. SIMMONDS said he had much pleasure in bearing corroborative testimony to the observations that had been made by Mr. Morson. Of the many valuable papers to which he had listened in that room, he did not remember one which he had followed with greater interest, or from which he had derived more practically useful information, than that with which they had been favoured by Mr. Stanford, a paper alike creditable to the industry and research of the author, and to the Society before which it had been read. The subject discussed was one in which he individually had taken much interest, and which had frequently been incidentally brought before the members. That the importance of the subject was not overrated was proved by the very liberal premium of £100 offered by Sir Walter Trevelyan—a premium which the erudition, experimental research, and eminently practical results of Mr. Stanford seemed to entitle him to. The mass of details and experimental results given could not be clearly appreciated from the mere abstract of the paper which had been read, but when the tabular statements, analyses, and practical information given came to be carefully examined and studied at leisure, the value of the paper, and the importance of the inquiry, as well as of the experimental researches carried out, would be better appreciated. Speaking for himself, he could but state that, having given some close investigation to the subject of the economic applications of seaweed for a work he was preparing for the press, on the utilization of waste substances and the undeveloped products, he thought he had, to some extent, mastered the details, but the paper of Mr. Stanford, in its exhaustive character, had quite taken the wind out of his sails, and left him little to add. When they considered, however, how little had yet been done with the vast mass of material forming the submarine vegetation of the ocean, while every other department of nature had been laid under contribution for the service of man, there was evidently wide scope for energy and investigation in applying this to useful purposes. France, it was shown, was already in advance of us in the kelp and iodine manufacture, and many other nations had given much more attention to the useful application of seaweed. We had occasionally, and locally, laid them under contribution for manure, or partial food use, as in the Sowl bread or laver, dulse, and tangle, and the so-called Irish moss; but they were applicable for many other purposes. As a stiffening substance they had been used in the place of starch and sago flour, and for size in the manufacture of paper. The French had lately used seaweed for wads for guns. But it was in the East, as Mr. Stanford had truly pointed out, that seaweeds were really an article of extensive commerce for food purposes and manufacturing uses. The so-called Japanese isinglass, or crude gelose, of which specimens were before them, showed the systematic mode of preparation, while the Chin-chow jelly, and the various species of Agar-Agar imported at all the ports, proved the extent of the trade. The statistics of this article, if they could be collected, would prove how important it was considered in the East. Between the 1st of November, 1858, and the 23rd

May, 1859, nearly 11,000 cwt. of this seaweed was exported from the single port of Nagasaki alone to China, where it was valued at about 8s. the cwt. Seaweed was collected over a wide extent of space for the Chinese market. It was also brought from Sooloo, and various islands of the Eastern Archipelago, by the tripang fishers. In Japan the *Laminaria saccharina* was in general use. Presents which were universal among all classes, were invariably accompanied by a complimentary paper so called; slips of this *Fucus* were pasted to both ends of it. Some interesting specimens of this seaweed, of various species of *Gracilaria*, *Eucheuma*, and jellies made with it, were likely to be exhibited from Japan, from Ceylon, Western Australia, and other quarters at the forthcoming Exhibition. They were in more general use for several purposes than was ordinarily supposed. The gulf weed (*Sargassum*) was used by seamen as a pickle, and it was to be hoped that attention would be more prominently drawn to it as an anti-scorbutic. Without trespassing further on the time of the meeting, as he saw many gentlemen present very competent to speak on the subject, he begged again to thank Mr. Stanford for his very masterly paper, on a subject which had hitherto been so much overlooked, if not considered beneath notice, by scientific men.

Mr. W. E. NEWTON said one of the great advantages of this paper was, that it would draw the attention of manufacturers, chemists, and scientific men to a substance which seemed hitherto to have been left entirely in the hands of the roughest possible workmen. Everyone acquainted with the manufacture of kelp was aware that its manipulation was an operation of the rudest character as at present conducted, and therefore they owed a debt of gratitude to Mr. Stanford for not only directing their attention to the subject, but also for giving them some very valuable information upon it, and furnishing the details of the processes by which they could arrive at such important commercial results. With reference to the paper just read, he begged to take exception to Mr. Stanford's remarks on one point, and would endeavour to give a little information on one subject to which he had not referred. With regard to the employment of peat, Mr. Stanford had stated, that, whereas in the manufacture of different products from the distillation of seaweed, all the residuum obtained was useful—the ashes of peat were entirely valueless. To that statement he (Mr. Newton) must take exception, because those who had paid any attention to the manufacture of peat, knew that the ash or charcoal obtained after the gases and oily products had been extracted, was a most useful article for manure and for other purposes in the industrial arts and manufactures. He (Mr. Newton) brought this subject before the attention of the Society about a year and a half ago, and in the paper he then read they would find a great deal of useful information, which he had obtained from parties who had paid a great deal of attention to the subject. There was one very peculiar weed which had not been noticed by Mr. Stanford, but he was not surprised at the omission, because it was not generally known, and was very local, being found, he believed, only on the coast of the South of Africa and round the Cape of Good Hope. That was the buckhorn plant, so called from its great resemblance, when dried, to buck's-horn, and he had seen some very curious articles produced from this plant. It grew to very great length, and was tubular, and when treated in such a way as to render it soft and capable of being moulded, it could be used as the very best buck's-horn without the least difficulty. He believed it was one of those things which would, when more known, come into very general use. Its mode of application had only been lately discovered, and therefore it was not surprising that it should have escaped Mr. Stanford's attention.

Mr. WM. HAWES remarked, that this was a paper in which the Society must feel considerable interest, because he believed he might say it originated from the prize that was offered by Sir Walter Trevelyan, which offer for two years

was placed before the public by the Society at that gentleman's desire. A prize of 100 guineas was offered for the best essay upon Marine Algæ. The first year in which that prize was offered there were no papers sent in, and Sir Walter Trevelyan continued his offer for a second year. In the second year there were two papers sent in, one of which was by Mr. Stanford, and he might say that it created a very lively discussion amongst the gentlemen who were selected to determine the award of the prize. Whilst the discussion was going on, Mr. Stanford was pursuing his inquiries, and having succeeded in giving a more practical character to those inquiries, he withdrew the paper he had sent in, with the view of turning to account the information he had collected. He hoped to bring his name before the public as a scientific man and a chemist, and he withdrew his paper in order that he might use the information he had obtained in the prosecution of his researches, and convert them to practical and commercial uses. Soon after that Mr. Stanford took out the patent to which he had referred, and that evening they had heard for the first time that these marine plants, which they were accustomed to look at and admire, but to which they attached no practical value, were likely to become of great commercial importance, in increasing the means of providing food and substances useful in the arts. As a member of the Society, he felt greatly obliged to Mr. Stanford for the manner in which he had brought the subject before them. It was true that he had patented his process, but at the same time he invited the fullest discussion upon it, and told them in fact that at present he had merely patented it, and was waiting for public opinion to be expressed upon the soundness of his views before he took any further steps in bringing it before parties interested in the production of kelp, which was the only commercial use to which seaweed was at present applied. He was sure the members of the Society wished Mr. Stanford the success which a persistent course in a very dry investigation entitled him to, and that they would see in his case another instance of an individual being most thoroughly and completely rewarded for his devotion to a subject which had been neglected by all scientific men who had preceded him.

Dr. MOSSOM MEEKINS remarked that a relative of his had long used sea-plants as a manure, and his success in procuring very large crops was evidenced by several remarkably fine samples of his deposited in the South Kensington Museum. He believed the plan he adopted was to collect the seaweed when fresh, as it was driven on the shore, and make it into manure heaps, formed of alternate layers of weed and earth, allowing it to remain until entirely decomposed, and then spreading it like other manure. With respect to the getting and taking of seaweed, he observed, that anyone was entitled to take drift seaweed floating in the water, but if it once rested on the shore it belonged to the owner of the shore, meaning by the shore the space between ordinary high and low water mark. The shore, by common right, belonged to the crown for the benefit of the public, but sometimes it was vested in private individuals by grant or prescription. In every case he thought that the principle, which was applicable to the parings of roads (which the proprietor of the adjoining property might elect to take, but if he neglected to remove them within a certain time his right lapsed) might be applied to drift seaweed, which, if the proprietor neglected to appropriate within a certain time after high water, then it might be open to anyone to take it. This was obviously for the public good, as large quantities of these plants were constantly washed in, which, if not at once secured, were certain to be carried off by the next tide.

Dr. REDWOOD was anxious to bear his testimony to the great value of the communication made that evening. Having for many years had the pleasure of Mr. Stanford's acquaintance, he had had opportunities of observing the great zeal and praiseworthy perseverance with which he had pursued his investigations of this subject, the results of which had been laid before the meeting that evening.

The importance to the manufacturing world resulting from this communication was of a varied character. Thus they had had indicated to them a method by which great improvements could be made in the mode of obtaining the products at present derived from seaweed, so that the quantities of iodine and potash salts could be greatly augmented, for, according to Mr. Stanford's process, they could get those salts in larger quantity, and in a higher state of purity than heretofore, being obtained at once from the lixiviation of the ashes. There were also other products which were at present entirely lost, but which might be turned in future to good account. It was doubtful whether these valuable products of distillation could now be made available; nevertheless Mr. Stanford had pointed out that by reducing the temperature at which the calcination of the seaweed was effected, they would derive an equivalent for an increased expenditure for the apparatus required for obtaining the augmented products. There was another point of considerable importance to which Mr. Stanford had directed their attention, ignorance with reference to which had hitherto led persons to neglect, to a great extent, giving any attention to the question of the manufacture of those products from seaweed. They had hitherto been given to understand, by persons who were supposed to be best acquainted with the subject, that the seaweed was not capable of yielding iodine in an available quantity, excepting when collected in certain localities. It was commonly stated that this was a peculiarity attaching to the kelp manufacture on the north-west coast of Ireland and in the west of Scotland, because in those situations the weed was watered by the Gulf stream, consequently, although the weed was found in great abundance on other coasts, it had been looked upon as worthless as a source of iodine, and no attempt had been made for years past to obtain iodine from the seaweed collected in such localities. Some years ago, it was pointed out by Mr. Graham that seaweed found upon the Channel Islands was capable of yielding iodine in sufficient quantity to make it worth the working; nevertheless, they had abundance of seaweed on other parts of the coast, which had been overlooked, and considered by practical men as useless for this purpose. Mr. Stanford's investigations had been directed to weeds collected in those localities, and it was a point of great importance that he had shown, that they were equally rich in iodine with those which had hitherto alone been practically worked for that purpose. Altogether, he thought the Society might congratulate itself upon having afforded Mr. Stanford an opportunity of bringing so important an investigation as this before the public, and he hoped it would be appreciated by manufacturers, as he was quite sure it would be by scientific men.

The CHAIRMAN said he was sure he should anticipate the unanimous feeling of the meeting when he proposed a vote of thanks to Mr. Stanford for his admirable paper. He could not refrain from expressing his high sense of the importance of some of the leading facts of this communication. New things were, of course, doubtful. If anybody brought forward a new substance, the first inquiry would be whether it was useful or not; but Mr. Stanford had shown that in the burning of seaweed a substance already known to be of great commercial value was wasted, viz., ammonia, which was one of the chief nutriment of plants; that which made wheat and bread was here entirely lost; and Mr. Stanford had shown that by the process he had described this ammonia could be collected and utilised. He had also shown that the substance for which seaweed was burnt—iodine—could be obtained by his process in about double the quantity as compared with the rough system hitherto adopted. Mr. Stanford's process would be most valuable, provided these products were shown not to cost more in their distillation than their present commercial value; but looking at the simplicity of the process, he did not anticipate that this was likely to be the case. It had been remarked by those who noticed the progress of invention that language generally had to undergo changes corres-

ponding with the changes of the times. Now he, for one, did wish that the word "weed" should cease to be applied in the indiscriminate manner it was to marine plants. Hitherto "weed" meant a useless or noxious plant. Mr. Stanford had shown that a vast proportion of marine plants, so far from being "weeds," in the ordinary acceptation of the word, were extremely useful vegetables; and he hoped they would come before long to limit the word "weed" to those marine plants which were worthless, or which were not capable of being turned to account. He thought Mr. Stanford's paper would prove an important step in leading to this result. He begged to propose a vote of thanks to Mr. Stanford for his paper.

The vote of thanks having been passed,

Mr. STANFORD said he could not thank the meeting sufficiently for the way in which his paper had been received, and for the patient attention which had been bestowed upon what he feared was to many rather a dry subject. He was particularly obliged to Mr. Simmonds for having supplied many deficiencies in his paper as to the economical application of edible algæ. He (Mr. Stanford) did not profess the botany of the subject; his information was almost entirely chemical. With reference to what had fallen from Mr. Newton, who had said that the charcoal from peat was a valuable residuum, he would observe that the results he had given were taken from the analyses which were expressly made for the Irish Peat Company; in their process the distillation was conducted in a blast of air by which the whole of the charcoal was destroyed, and nothing but ash left, which contained no phosphates, and scarcely any alkalies, and was consequently of no value as manure. He thought that result justified him in the statement, that whilst seaweed ashes were valuable, peat ash was valueless. With regard to what had fallen from the Chairman as to distillation, he believed it would be admitted that if iodine was obtained in larger quantity and the cost of sulphuric acid was saved, the additional expense of the more elaborate system of treatment would be covered, without reckoning the value of the products of distillation. For his own part he considered the whole cost of distillation would be repaid by the additional yield of iodine and chloride of potassium. He might add that he should rejoice to see the algæ rescued from the title of "weeds" and called "marine plants," and hoped this paper might be conducive in some measure to that end.

The Paper was illustrated by collections of foreign algæ, kindly lent by Mr. P. L. Simmonds and Mr. M. C. Cooke. A fine herbarium of British algæ, and a sample of crude gelose, as imported from Japan, were furnished by Mr. Daniel Hanbury. The chemistry of the subject was illustrated by a number of specimens of products obtained in the present manufacture of kelp; and by a complete series of the new substances added by Mr. Stanford's process. Specimens of gelose, carrageenin, oxalic acid, gum, and cellulose from the algæ, were also exhibited.

The Secretary announced that on Wednesday evening next, the 19th inst., a Paper by Mr. H. C. Salmon, F.G.S., F.C.S., "On the Relative Merits of the different Systems of Working Metallic Mines and Collieries," would be read.

The following letter has been received by the Secretary:—

"Sir,—I trust that Mr. Stanford's very able and interesting paper will have the effect of directing public

attention to the properties and uses of those greatly-neglected members of the vegetable kingdom, the marine algæ. It is indeed remarkable that a raw material, presented to us in such vast quantities, should, up to the present date, have been allowed to remain without use or application, while the "utilisation of waste products" forms so prominent a feature in the arts and manufactures of the age. Great Britain alone, irrespective of Ireland and the Scottish Isles, possesses a sea-coast line of about seven thousand miles in length, from which I have reason to believe that seaweed could be collected to any amount, up to an average of 3,000 tons per mile per annum, or rather more.

"Of this vast and tolerably regular natural supply, what a minute proportion is now collected. Even in its most prosperous days, kelp was never manufactured to a greater extent than 28,000 tons per annum, as far as I can learn. The applications of algæ as food and medicine are, as Mr. Stanford truly observes, exceedingly limited, but I am of opinion that these might soon be very considerably extended if the inquiry were entered upon in a really systematic and practical manner.

"Several of the gelatinous varieties would doubtless become very palatable if boiled or macerated for a sufficient length of time in water or syrup (in the same way that the Chinese preserved ginger is prepared), or if converted into 'candy.' I have myself tasted some varieties of *Dictyota* and *Punctaria* thus prepared, which were by no means unpalatable.

"With the mucilaginous substance obtained from the *Gelidium corneum*, and other seaweeds, I have prepared paper for photographic purposes, giving pleasing 'tones' and very durable pictures.

"I have often regretted that the manna of commerce should remain so costly for the poorer classes, as if more reasonable in price it would be greatly in demand as a mild and simple purgative, especially adapted for children and many adults of delicate constitution. Now the retail price of this manna (which varies greatly in quality) is about 6d. to 10d. per ounce, according to the conscience of the druggist selling the same, while the same substance, or, more correctly, its active principle, mannite, might easily be sold for about 1½d. per ounce, if prepared in large quantity from seaweed. Some years back I extracted some pounds from the *Laminaria* (various species), and placed a portion in the hands of a provincial druggist, under the title of 'prepared manna.' It soon 'gave great satisfaction' to the customers, and the druggist offered to purchase the article at a higher rate than he paid for the foreign manna. I need hardly say that the transaction, being 'out of my line,' was 'declined with thanks.' In some specimens of *Laminaria* I have found as much as 17·5 per cent. of mannite.

"I am sure we are especially indebted to Mr. Stanford for his analytical tables of various seaweeds; these can require no corroboration, but for the sake of comparison I enclose a few of my own results in a similar direction.

"As regards the destructive distillation of seaweeds, a wide and useful field of research is open to us, as the kind and quality of the products obtained always vary with the temperature employed, a fact, I think, not mentioned by Mr. Stanford. Here I come to what strikes me to be the only weak point in the paper, the details of the distillatory process not being given with sufficient precision, any alteration in the amount of moisture present, or in the heat, altering the results accordingly. I have, on several occasions, obtained minute quantities of trimethylamine (and other similar 'ammonias') from various *Fuci*, by distillation in a current of steam, and should be glad to hear if others have met with the same results.

"Although the natural colours of many seaweeds are extremely beautiful—especially among the *Rhodosperms*—I do not think many attempts have been made to extract the colouring matters of these for dyeing purposes. In this branch of the subject I hope to have the honour of laying a few results before the Society. Several

varieties of *Griffithsia* yield a brilliant crimson colour to pure water, which is precipitated again on the addition of certain soluble chlorides. This substance (which might be very appropriately called *Rubalgine*) appears to combine with alumina and other metallic oxides. Again, on many shores may be observed masses of a fine yellowish-brown alga, which, after a few hours' exposure to the sun's rays, change to a deep red hue; surely a chemist may take the hint here thrown out. The colour may generally be developed from these 'weeds' (*Plocamium*) artificially under the influence of an oxidizing agent, such as nitric acid or formiate of potassa.

"Even on this highly interesting subject, however, my observations must not be too lengthy, so I will conclude, for the present, with the remark that, in the ash of *Rhodomela subfusca* (of which I enclose specimens), I have determined as much as 19 per cent. of potash, a higher proportion, I think, than Mr. Stanford has met with.

"With best wishes for that gentleman's success in his valuable and extensive researches,

"I am, &c., "WENTWORTH L. SCOTT.
"Bayswater, London, W., Feb. 12th, 1862."

MEETINGS FOR THE ENSUING WEEK.

- MON.....British Architects, 8.
Medical, 8g. Mr. Henry Thompson, F.R.C.S. Lettsomian Lectures.—2. "Lithotomy—Concluded. Lithotrixy Instruments; their principles of construction; their adaptation to varied purposes."
TUES. ...Civil Engineers, 8. Continued discussion upon Mr. Samuda's paper, "On Iron-Plated Ships."
Statistical, 8. Dr. Levi, "On National Debts."
Pathological, 8.
Ethnological, 8. 1. Mr. John Crawford, "On the Civilization and Affiliation of the Races of Man from the evidence of their systems of Numeration." 2nd. Mr. W. Bollaert and Don Ramon de Silva Ferro, "On the Idol Human Head of the Jivaro Indians of Ecuador."
Royal Inst., 3. Mr. John Marshall, "On the Physiology of the Senses."
WED. ...Society of Arts, 8. Mr. H. C. Salmon, F.G.S., F.C.S., "On the Relative Merits of the different Systems of Working Metallic Mines and Collieries."
London Inst., 7.
THURS...Royal, 8g.
Antiquaries, 8g.
Linnæan, 8. 1. Mr. Masters, "On Axile Placentation." 2. Mr. Benthani, "On *Inocarpus edulis*." 3. Dr. Harvey, "On *Algae*," collected by Dr. Lyall on the north west coast of North America.
Chemical, 8.
Numismatic, 7.
Royal Soc. Club, 6.
Royal Inst., 3. Professor Tyndall, "On Heat."
FRI.Royal Inst., 8. Mr. James Fergusson, "On the Site of the Holy Sepulchre at Jerusalem."
SAT.Royal Inst., 3. Rev. A. J. D'Orsey, "On the English Language."
Roy. Botanic, 3g.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, January 31st, 1862.]

Dated 20th January, 1862.

140. W. S. Mappin, Birmingham—A new or improved lock.
142. T. Holt, Edward-street, Blackfriars-road—Imp. in folding iron chairs and chair bedsteads.
144. W. Boaler, Manchester—Certain imp. in the method of sizing paper yarns and woven fabrics, and in machinery or apparatus connected therewith. (A com.)
146. J. Bird, Blidworth, Nottinghamshire—An improved crank axle applicable to cranks of any description whatsoever wherein the wear is mainly on one side thereof.

Dated 21st January, 1862.

154. J. Bate, 18, Crescent, Birmingham—Imp. in machines for corking or stopping the mouths of bottles, jars, or any vessel requiring to be stopped up air-tight.
156. G. T. Bousfield, Loughborough-park, Brixton—Imp. in machinery for making nails and spikes. (A com.)
160. W. Burgess, Newgate-street—Imp. in reaping and mowing machines.

Dated 22nd January, 1862.

164. I. Roberts, Liverpool—Imp. in combined hydraulic motive power engines and meters.
168. T. Little and J. Little, Alston, Cumberland—Imp. in apparatus for cooling coffee berries.

[From Gazette, February 7th, 1862.]

Dated 30th September, 1861.

2438. E. Reoche, Rue d'Enghien, Paris—A new medicinal preparation applicable internally for rheumatism and other disorders.

Dated 22nd November, 1861.

2935. T. W. Davenport and S. Cole, Balsall Heath, Worcestershire—Improved compositions to be used in making buttons, beads, miniature and picture frames, and other articles susceptible of being moulded in a plastic material.

Dated 23rd November, 1861.

2492. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved apparatus for the multiplication of motive power. (A com.)

Dated 4th January, 1862.

34. J. Howden, Glasgow—Imp. in steam engines and boilers.

Dated 9th January, 1862.

59. C. W. Siemens, 3, Great George-street—Imp. in the means and apparatus employed for insulating and protecting telegraph conducting wires, and in apparatus for working the same. (Partly a com.)

68. B. Thompson, Birmingham—Imp. in ordnance and fire-arms, and in projectiles to be used therewith. (A com.)

Dated 10th January, 1862.

74. F. Moores, Warrington, Lancashire—An improved method of obtaining motive power by means of water wheels.

Dated 11th January, 1862.

86. W. Wilkinson, 20, Charlotte-street, Fitzroy-square—Imp. in ornamenting and decorating metals, glass, porcelain, parchment and other skins, and in the materials and ingredients employed therefor, also in protecting silver and gold on said materials, and on surfaces or plates of glass or metal, or plates of glass and metal combined, applicable to works of art, furniture, jewellery, and other articles of a useful and ornamental character.

Dated 14th January, 1862.

102. E. W. Hughes, 22, Parliament-street, Westminster—Imp. in malleable cylinders used in engineering and architectural structures.

110. J. Harris, Newton Abbot, Devonshire—An improved semaphore target marker.

Dated 15th January, 1862.

114. T. Timmins and T. Simmons, Birmingham—An improved bath, combining in itself the advantages of the hot air or Turkish bath with the vapour, slipper, hot and cold water shower bath.

116. H. D. P. Cunningham, Bury, near Gosport—Imp. in means or apparatus for protecting screw propellers from entanglement or being fouled by ropes or other bodies, also imps. in means or apparatus for closing up the screw aperture.

Dated 16th January, 1862.

117. J. Brooke, Leeds—Imp. in the form of lubricators.
121. W. Tristram, Bolton—Certain imp. in power looms for weaving

Dated 17th January, 1862.

125. J. M. Rowan, Glasgow—Imp. in the construction of steam hammers.

127. N. Thompson, 55, St. Paul's-road, Camden-town—Imp. in apparatus for stopping bottles.

129. R. Romaine, Devises—Imp. in apparatus to be used in cultivating land by steam power, and in steam boilers used for agricultural and traction purposes.

Dated 18th January, 1862.

131. T. Emmott and J. Travis, Oldham, Lancashire—Imp. in the manufacture of velvets, velveteens, and other similar piled fabrics.

133. E. Davies, Warrington—Imp. in apparatus for gauging and cutting soap.

134. W. Helme, Caldbeck—A new or improved fire-lighter.

135. J. J. Stevens, Darlington Works, Southwark—Imp. in "point" indicators for railways.

Dated 20th January, 1862.

143. T. W. Jobling, Point-pleasant, Northumberland—Imp. in the adaptation of locomotive engines to traction or haulage in mines.

147. E. C. Nicholson, Locksfields, Surrey—Imp. in the preparation of colours suitable for dyeing and printing.

148. J. W. Agnew, Windsor-chambers, Great Saint Helens, City—A new or improved kind of last capable of being adjusted to various sizes and to various shapes of toes. (A com.)

Dated 21st January, 1862.

151. J. A. Knight, 4, Symond's-inn, Chancery-lane—Imp. in the permanent way of railways. (A com.)

152. J. F. Tourrier, 41, Manchester-street, Manchester-square—An improved method of, and apparatus for, warming adjoining houses by means of air chambers attached to grates in the party walls dividing such houses.

153. C. Binks, Gray's-inn—Imp. in generating steam, in superheating steam, and in apparatuses employed therein.
155. H. B. Barlow, Manchester—Imp. in machinery or apparatus for counting and indicating the number of revolutions of shafts or other articles, and for exerting power. (A com.)
157. J. H. Rawlins, Hope Paper Mills, near Wrexham—Imp. in machinery used in the manufacture of paper. (A com.)
158. A. J. Martin, High-street, Bow—Imp. in the treatment of fusel oil, and for various applications of the same to useful purposes.
159. R. A. Brooman, 166, Fleet-street—Imp. in street and road sweeping machines, parts of which are applicable to the separation of liquid from solid substances. (A com.)
161. M. Henry, 84, Fleet-street—Imp. in the mode of and apparatus for applying electricity to horology. (A com.)

Dated 22nd January, 1862.

163. L. Martin, Paris, No. 13, Rue Gaillon—Imp. in the treatment of mineral oils, and in the apparatus connected therewith.
165. F. W. Gerish, East-road, City-road—Imp. in printing presses.
166. E. Pace, Queen-street—Imp. in laths for Venetian blinds, in painting such laths, and in raising and lowering Venetian blinds.
167. A. J. Beer, Canterbury—Imp. in the valves of steam and other motive engines.

Dated 23rd January, 1862.

172. J. Wallace, Dumbarton, N.B.—Imp. in reaping machines.
174. W. H. Ropes, Crown-court, Old Broad-street—Imp. in machinery or apparatus for cleaning coffee, rice, or any seed or grain, having an outer hull and inner pellicle. (A com.)
176. G. Rogers, Staines, Middlesex—Improved mechanical arrangements for letting-off water or other liquids from butts, vessels, or cisterns.
177. J. C. Johnson, Nottingham—Imp. in the manufacture of twist lace in twist lace machines.
178. A. Ripley, Brook-street, Lambeth—Imp. in the construction of pistons.
179. H. Yates, Cecil-street, Strand—Imp. in machinery for bending, repairing, or renewing defective or damaged parts of iron rails.
180. J. G. Service, Glasgow—Imp. in machinery or apparatus for cutting and scoring pasteboard and other similar material.

Dated 24th January, 1862.

181. A. W. Williamson, University College, London—Imp. in tubulous boilers or steam generators.
182. J. Higgin, Manchester—Imp. in machinery for retarding and stopping railway carriages.
183. J. Cornforth, and B. Smith, Birmingham—New or improved machinery for boring or drilling gun-barrels and tubes and other articles having a cylindrical or prismatic figure, which said machinery may also be applied to other like purposes.
184. W. Clark, 53, Chancery-lane—Imp. in the manufacture of artificial flowers, leaves, and fruits. (A com.)
185. J. Longhurst, Ticehurst, Sussex—Imp. in chain and chain cables.
186. J. Rock, jun., Hastings—Imp. in common road carriages.
187. J. W. Girdlestone, Birkenhead—Imp. in projectiles for fire-arms.
189. C. G. Hall, Regent-street—Imp. in the manufacture of boots, shoes, and leggings.
190. A. Wallis and C. Haslam, Basingstoke—Imp. in thrashing machines.
191. J. Alison, Brightland, Reigate, Surrey—Imp. in apparatus for tilling land by steam power.

Dated 25th January, 1861.

192. W. Baker, Downham, Norfolk—Imp. in fire-arms, adapted to prevent their accidental discharge.
193. W. Johnston, Glasgow—Imp. in lamps.
195. J. C. F. Mougin, Paris—Imp. in barcelonnettes or cradles for children or for dolls.
197. D. Edleston and H. Gledhill, Halifax—Imp. in means and apparatus for finishing textile and other fabrics.
198. E. A. Curley, 4, Green-terrace, New River-head, Clerkenwell—Certain imp. in sewing machines.
199. J. Wright, Rochester, Kent—Imp. in constructing works below water.
200. F. J. L. Lefort, Bothey, Belgium—Improved mechanical arrangements constituting a secret and invisible safety lock applicable to iron safes and other depositories.
201. F. Roberts, Maiden Newton, and A. Roberts, Frome Vauchurch, Dorsetshire—Imp. in apparatus for ploughing or cultivating land.
203. A. Samuelson, 28, Cornhill—Imp. in hydraulic presses, and in the mode of working the same.

Dated 27th January, 1862.

206. S. A. Carpenter, Birmingham—An imp. or imps. in covering and combining strips or bands of steel for crinoline or crinoline skirts.
207. R. Martindale, Handsworth, Staffordshire—Imp. in globes and glasses to be used with hydro-carbon lamps.
208. C. W. Harrison, Lorimer-road, Walworth—Imp. in printing, stamping, embossing, perforating, and other like operations, and in the machinery or apparatus employed therein.
209. W. Orr, Greenock—Imp. in machinery or apparatus for the manufacture of sugar.
210. J. Smith, Spring-row, Keighley, Yorkshire—Imp. in the construction of covered rollers used in machinery for preparing, roving, spinning, twisting, and doubling fibrous materials.

212. T. J. Robotham, Burslem, and N. Hackney, Hanley, Staffordshire—Imp. in purifying slip, glaze, and other potters' materials.

Dated 28th January, 1862.

216. J. Hankins, Bristol—A new composition or wash to be applied to marine and other steam boilers to prevent incrustation.
217. J. Hunt, Birmingham—An imp. or imps. in the manufacture of gas and other chandeliers.
220. A. H. Church, 170, Great Portland-street—Imp. in the means of preserving stone, brick, slate, wood, cement, stucco, plaster, whitewash, and colour wash from the injurious action of atmospheric and other influences, also in the application of colours to the surfaces of stone, brick, slate, wood, cement, stucco, mortar, clay, plaster of Paris, plaster, whitewash, and colour wash, and in the retention of such colours thereon.
221. C. Culling, Downham Market, Norfolk—Imp. in fire-arms.
223. G. H. Morgan and E. Morgan, Grand Junction-terrace, Edgeware-road—Imp. in carriages.
224. G. Chapman, Rutland-street, Leicester—Imp. in rotating circular knitting frames.
225. G. J. N. de Ridder, 57, Rue Pigale, Paris—Imp. in railway carriages for the conveyance of travellers and goods.

Dated 29th January, 1862.

230. T. Clayton and W. Smith, Knowlwood, near Todmorden, Lancashire—An improved flyer.
232. L. A. Pulvé, 15, Passage des Petites Ecuries, Paris—Imp. in fireproof iron chests and strong boxes.
240. W. E. Newton, 66, Chancery-lane—Imp. in the boxes for the journals of railroad carriage and other axles. (A com.)
242. M. Collier, Failsforth, Lancashire—Imp. in looms for weaving.

Dated 30th January, 1862.

246. E. A. Rippingille, Staple Hill, near Bristol—Imp. in engines worked by steam or other fluid, and in pumps.
248. H. Robottom and R. Underwood, 31, Robert-street, Hoxton New Town—Imp. in watches and pocket chronometers.
250. W. Clark, 53, Chancery-lane—Imp. in mechanical wrenches. (A com.)
252. A. Lahousse, Brussels—Imp. in the manufacture of wheels for waggons, locomotive engines, and other vehicles used for railway purposes.

INVENTION WITH COMPLETE SPECIFICATION FILED.

298. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of iron and steel. (A com.)—4th February, 1862.

PATENTS SEALED.

[From Gazette, February 7th, 1862.]

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|---------------|--------------------------------|
| February 5th. | 2004. A. Salomons. |
| February 7th. | 2008. J. C. Horner. |
| February 7th. | 2009. J. Jacob. |
| February 7th. | 2011. S. Andrew and S. Hornby. |
| February 7th. | 2012. J. G. Remy. |
| February 7th. | 2024. E. Edwards. |
| February 7th. | 2032. J. C. Martin. |
| February 7th. | 2036. S. Desborough. |
| February 7th. | 2692. C. Stevens. |

[From Gazette, February 11th, 1862.]

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|----------------|------------------------------------|
| February 11th. | 2113. G. T. Bousfield. |
| February 11th. | 2152. P. Jewell. |
| February 11th. | 2153. A. V. Newton. |
| February 11th. | 2179. J. M. Dunlop. |
| February 11th. | 2197. G. Bischof, jun. |
| February 11th. | 2220. T. Greenwood. |
| February 11th. | 2284. W. E. Newton. |
| February 11th. | 2354. C. Perman. |
| February 11th. | 2556. G. Twigg. |
| February 11th. | 2576. A. V. Newton. |
| February 11th. | 3066. J. J. Russell & B. L. Brown. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, February 7th, 1862.]

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|------------------|----------------|
| February 4th. | February 5th. |
| 333. R. Tinkler. | 383. J. Evans. |
| 350. B. Burrows. | |

[From Gazette, February 11th, 1862.]

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|-------------------------------|--------------------|
| February 6th. | February 7th. |
| 342. M. Curtis and J. Miller. | 343. J. Lee. |
| 356. J. B. Redman. | 346. J. Smith. |
| | 406. W. E. Newton. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, February 7th, 1862.]

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| February 5th. |
| 441. G. M. Miller and J. Wakefield. |
| February 8th. |
| 322. J. Ramsbottom. |

Journal of the Society of Arts.

FRIDAY FEBRUARY 21, 1862.

INTERNATIONAL EXHIBITION OF
1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £446,500, have been attached to the Deed.

Guarantors holding ivory tickets for visiting the building are informed that those tickets are no longer available.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

On the 12th of February, at noon, the building was delivered over by the Contractors to Her Majesty's Commissioners. Although much remains to be done before it may be called entirely completed, it is sufficiently advanced to admit of the reception of those goods which must necessarily be on the spot at once. Already a few cases have been received, the first arrival in the building being a collection of raw materials from Liberia. St. Helena has come in a close second, with some very similar packages; these, of course, will remain as yet unpacked until the northern courts are finished.

The glazing and painting of the domes are going on as quickly as possible, and are so far advanced as to promise an early completion. Last week, for the first time, the whole of the eastern dome rested entirely on its own supports. It is satisfactory to be able to add that the deflection in the columns, which was expected to amount to four inches, nowhere reached a greater extent than half-an-inch. As soon as the glazing and decorating are finished, the removal of the scaffolding will immediately commence, a process which will occupy some time, but which must necessarily be finished before the flooring underneath can be constructed.

The men are at work on the flooring of the northern courts, and the staircases admitting to the galleries all over the building are nearly finished. The contractors have put up several stoves in the picture galleries, in order to thoroughly dry and ventilate them before the pictures come in.

The refreshment courts are being plastered, and the floors of the upper story are laid. The contractors for refreshments, both foreign

and English, are understood to be making great exertions to supply the requirements of the public.

Immediately after the building was placed in the hands of Her Majesty's Commissioners, a body of police took possession. A corps of commissionaires, specially raised for the occasion, are installed to act as messengers and general attendants, and the authorities at the War-office have placed at the disposal of Her Majesty's Commissioners a company of Royal Engineers, who are already busy at work marking out the spaces which have been allotted to English exhibitors.

Although the staff of Her Majesty's Commissioners do not come down to the building until next week, several of the officials are already on the spot, and a number of temporarily constructed offices are occupied by them in the Southern Courts. Among them are Mr. R. Thompson and Mr. P. C. Owen, the British and Foreign Superintendents, besides several of the Superintendents of Classes.

Her Majesty's Commissioners have placed the question of Juries entirely in the hands of Dr. Lyon Playfair, as Special Commissioner, who occupied the same position in the Exhibition of 1851. This important branch of organisation, which has hitherto been somewhat delayed, will now be proceeded with as rapidly as possible. The manner in which it has been decided that the Juries should be selected will be at once understood from the following decision which has been lately published:—

DECISION XI.

"Prizes or rewards of merit, in the form of Medals, will be given in sections I., II., III."

- (a) These medals will be of one class, for Merit, without any distinction of degree.
- (b) No exhibitor will receive more than one medal in any class or sub-class.
- (c) An International Jury will be formed for each class and sub-class of the Exhibition, by whom the medals will be adjudged, subject to general rules which will regulate the action of the Juries.
- (d) Each Foreign Commission will be at liberty to nominate one member of the Jury for each class and sub-class, in which staple industries of their country and its dependencies are represented.

Her Majesty's Commissioners have resolved that an industry shall be ranked as a staple one which has 20 exhibitors in a class, or 15 exhibitors in a sub-class.* But Her Majesty's Commissioners will give to each Foreign Commission the alternative of sending a specified number of Jurors, determined by the experience of past Exhibitions, and by the relative spaces allotted to the several countries.

- (e) The names of the Foreign Jurors must be sent to Her Majesty's Commissioners before the 10th of March, 1862. At the same time, the class or sub-class on which each Juror is to serve must be specified.

* In the nomination, each sub-class is to be considered a separate Jury. Should it happen that a Foreign Commission is not represented by 15 exhibitors in any of the sub-classes of a general class, the fact that they have an aggregate of 20 exhibitors in the whole class would not entitle them to a Juror. The sub-classes will act as separate Juries, only to be united for confirmation of awards, and for general purposes of administration.

- (f) The British Jurors will be chosen in the following manner:—

Her Majesty's Commissioners will take steps to secure a certain number of Jurors on behalf of India and the colonies; and every exhibitor in the United Kingdom will propose the names of three persons to act on the Jury for the class in which he exhibits.

From the persons so named, Her Majesty's Commissioners will select the requisite number of Jurors.

- (g) The names of all the Jurors will be published in April, 1862.
- (h) The Juries will be required to submit their awards, with a brief statement of the grounds of each, to Her Majesty's Commissioners before the 15th day of June, 1862.
- (i) The awards will be published in the Exhibition Building, at a public ceremony.
- (j) They will immediately afterwards be conspicuously attached to the counters of the successful exhibitors, and the grounds of each award will be very briefly stated.
- (k) If an exhibitor accepts the office of Juror, no medal can be awarded in the class, or sub-class, to which he is appointed, either to himself individually, or to the firm in which he may be partner.
- (l) The medals will be delivered to the exhibitors on the last day of the Exhibition.

The *Empress of the Seas*, which was burnt off Port Philip, we now learn by later advices had no Exhibition goods on board; but the *Orient*, which has been damaged by fire, has on board 85 packets of South Australian goods, including wine, flour, barley, native woods, jams, copper and other ores, malachite, slates, oil paintings, photographs, and shells. Other vessels are also on their way from the same settlement with mixed cargoes of native produce for the Exhibition, such as soap, wool, and dried plants.

The province of Nelson, New Zealand, has shipped a valuable collection of coal specimens, cloth, wool, gold, timber, hops, photographic views, and samples of furniture made from native woods, the very names of which would make the fortune of advertising upholsterers. Red Manuka chairs, Totara couches, and Ti-tree tables, to say nothing of many other productions, ought really to create a new sensation.

Tasmania is determined to be well represented in the forthcoming display, and she has, therefore, not only shipped some fine specimens of anthracite coal and iron ores from her vast coal fields, with topazes, polished marbles, furs, skins, fine fleeces of wool, and models of native fruit, but she is going to erect a trophy in the building—a column nearly one hundred feet high, made of native woods, capped with the flag of the colony, and surrounded at the base with ornamental woods worked up into models of whale-boats and whaling apparatus. This column will have a winding staircase inside, and will doubtless be a leading feature of the Exhibition.

Queensland, a young Australian colony of scarcely two years' growth, has shipped a full collection of cotton, maize and wheat, coal and

copper, wine, wool, tallow, oil, and honey, models of ships, stuffed animals, birds, and preserved insects, blocks of marble, native woods, and photographs, with dresses made from native cotton and wool, and a number of aboriginal ornaments and implements.

From New South Wales we shall get a fine-art display, consisting of oil paintings, water-colour drawings, photographs, works in the precious metals, pottery, specimens in fancy bookbinding, music publishing, and cabinet and leather work. The textile fabrics sent will include native cloths and lace; and the minerals, coal, copper ore, iron, gold, and fossils. The settlement has also shipped a quantity of agricultural produce, some valuable native woods and wines, samples of sugar, wool, tallow, hides, and preserved beef, and also some soap, candles, and blacking. The Colonies evidently mean business at the Exhibition, and will display the useful quite as much as the beautiful.

On Saturday next the offices of Her Majesty's Commissioners in the Strand will be finally given up, and the only Western Central office where season tickets for the Exhibition can be obtained, on and after Monday next, will be at the house of the Society of Arts. A calculation has been worked out, showing that each three guinea ticket, if fully used by its holder, will admit on occasions when the separate payments for admission would amount to nearly £21.

A Sub-Committee has been appointed in England, with the view of collecting for Exhibition productions of Italian Art, consisting of the following gentlemen:—

Marquis D'Azeglio, *President*; J. C. Robinson, Esq.; M. Digby Wyatt, Esq.; R. Redgrave, Esq., R.A.; E. Oldfield, Esq.; D. Colnaghi, Esq.; J. B. Heath, Esq., Consul-General for Italy; the Baron Marochetti; the Count Certi, and the Prince Butera.

Henry Graham, Esq., has been appointed Commissioner in London to represent the interests of Italian exhibitors.

THE BRITISH TEXTILE DIVISION. INTERNATIONAL EXHIBITION OF 1862.

As nothing has been said at present about the prospects of this important section of the coming exhibition, it is gratifying now to report that there is every promise that the display will be of a very practical and useful character; and whilst our continental friends will, probably, "hold their own," as respects the more ornate fabrics, we shall show that the arts of design have not stood quite still, even in the commoner articles of every-day use, whilst in those tissues in which sound make, excellent dyes, and perfect finish are essential, the advance will be proved to be unmistakable. The class of cottons will receive its strongest contributions from Glasgow, Manchester, as in 1851, having scarcely made any effort worth naming. Singularly enough, whilst this industry represents almost one-third of our exports, the two classes within which it is comprised, classes 18 and 23 (the latter for prints only) will be the two smallest displays of the textile division. Perhaps the present condition of trade may have something

to do with this. It is, however, pretty certain, that if ever we are to have a really national exposition of this department of industry, we must not rely upon its being got up by the manufacturers themselves.

In woollen and mixed fabrics there will certainly be a more satisfactory series of exhibits. Bradford shows in a collective form. Huddersfield, Halifax, and Leeds take a similar course in the classes to which their products belong. Glasgow follows its movement in cottons, by showing moderately in Class 24, lace and embroidery; and most effectively in mixed fabrics, in Class 21. Paisley and Norwich, together with Dublin, will keep up each its old reputation, and the space for these seats of industry, the objects shown being varied in colour and texture, has been so arranged in the plan as to come nearest to the eastern dome; and as the whole of the textile division is in the south galleries, and in fact occupies the whole of the available space in that locality, it is intended that this portion, at all events, shall be made as effective as possible, and yet in keeping with the general result of the arrangements.

The heavy woollens, tweeds, &c., of Scotland, with the blankets of Witney and the flannels of Rochdale, will occupy less prominent but excellent positions in one of the cross galleries, the lace being placed in the other. Here Nottingham takes an important post, and there is every promise that the results will be highly satisfactory, alike as regards design and execution. The products of lace for the metropolitan market will also make an important display here.

The silk manufacturers are to be placed against the north wall of the picture gallery, thus getting a purely north light; a great desideratum, as a large amount of valuable material is soon spoiled in positions in which it cannot be defended effectively from the sun. It is expected that the arrangements in this class will be of one uniform character throughout, London, Manchester, and Macclesfield combining for this purpose. With one or two exceptions all the best houses will be well represented. Coventry will contribute its ribbons, but not to any great extent.

The linen manufacture follows silk in this gallery, and the staple of the north of Ireland and some parts of Scotland will be efficiently represented. The Belfast Local Committee, too, have organized a trophy for the great nave of the building.

In the gallery which leads from the back of the picture gallery to the eastern dome, the class for clothing is placed, and the arrangements will commence with the feet, in a display of boots and shoes, and pass gradually and systematically up to the head, finishing at the dome with hats. This class has unfortunately needed a great amount of "weeding out," as claims were made for space which could not be complied with, except at the expense of more important industries; for, after all, the art of the tailor and milliner is so thoroughly the slave of fashion, that unless a great amount of space could be commanded, the more fixed industries had, of necessity, the prior claim.

It is satisfactory to know that the arrangements of the textile department, which have again been undertaken, as in 1851, by Mr. George Wallis, are in a state to give every facility to the exhibitors in fitting-up their space at once. The general plans were completed, and the allotments in plan, collective and individual, were all sent out, except in a few unimportant instances, by the day Her Majesty's Commissioners had possession of the building. On the following day, the 13th, the marking off of the spaces on the floors of the south galleries, was commenced, in order that the precise position of each exhibit may be defined; and, as a final matter, the catalogue for the whole division was fully revised in proof by Mr. Wallis, as an official reference during the arrangements. As a matter of interest, it may be stated that the exhibitors' space for textiles comprises a nett amount of nearly 18,000 square feet of floor, independently of all passages, and the vertical space occupied will probably amount to 100,000 square feet more.

ROME AND THE INTERNATIONAL EXHIBITION OF 1862.

The correspondent of the *Daily News* writes:—"In my letter of the 15th January I gave a brief account of the contributions to the sculpture gallery of the London Exhibition, which are being dispatched from Rome. Having then described the works sent by Gibson, Story, Harriet Hosmer, Spence, Gatléy, and Shakespeare Wood, I shall now mention those of the remaining English and American sculptors of eminence. Among the most original will be considered Mr. Rogers's *capo d'opera*, the bronze gates intended for the Capitol at Washington. Like the Gates of Paradise at Florence, the bas-reliefs on the panels of these doors constitute a continuous history, and Mr. Rogers has, with excellent taste, chosen his nine subjects from the life of the great discoverer of America; the large semi-circular space on the summit being occupied by the triumphant figure of Columbus planting the standard of Spain on the Island of San Salvador. The door-posts and lintel, the rails and styles of the doors, are also enriched by beautiful sculpture of arabesques, intermixed with heads of the historians and statesmen of America. The bronze casting of this fine work has been executed at Munich, in a superior style, and of a deep golden-coloured bronze, which must produce an exceedingly rich effect.

"John Adams sends a statue of a boy playing at the favourite Roman game, still in common use, though described so long ago by Ovid in his 'Elegia de Nuce':—

"Quatuor in nucibus, non amplius, alea tota est
Cum sibi pospositis additur una tribus."

"Macdonald's contributions consist of a mendicant and a bacchante. I cannot but regret he has not added another of his works—an angel kissing a sleeping child. A beautiful statue is the Diana of Mr. Cardwell. He has treated admirably a subject which modern sculptors have rarely attempted, albeit it was as great a favourite among their predecessors as Venus or Apollo. The noble figure—no mere nymph, but a stately goddess—is preparing to descend into the bath, languidly leaning backward meanwhile in an attitude of great repose and grace. The face has a soft and dreamy expression, such as actually suggests the thoughts of moonlight, and well befits the celestial Luna, the goddess-lover of Endymion. The same artist has already sent to England, for exhibition, a group representing the mythical form of the venerable adage, *Omnia vincit Amor*; in other words, Cupid conquers Pan. The contrast of the graceful limbs of Love, and the brutish form of the Satyr, is very fine in an artistic point of view, but the subject is less pleasing than Diana. The Americans, who so warmly hail on all occasions the talents of their countrymen, will rejoice to see two national works by Mr. Mozier—an Indian girl celebrated in the early history of the colonies, and a young lady that was long lost among the Indians, and was at last restored to her parents, and who is well known in American romance as 'The Wept of the Wishton-wish.' Besides these, Mr. Mozier sends a group of the Prodigal Son and two statues,—one of Queen Esther, the other of Jephtha's Daughter."

TENTH ORDINARY MEETING.

WEDNESDAY, FEB. 19TH, 1862.

The Tenth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 19th inst., Thomas Sopwith, Esq., F.R.S., in the chair.

The following candidates were proposed for election as members of the Society:—

Andsley, Geo. Ashdown. { 1, Canning-chambers, South
John-street, Liverpool.

Armstrong, Walter	69, Aldermanbury, E.C.	Whitmore, Wm. Fred....	{ 16, Bishopsgate-street Within, E.C.
Beaumont, John A.	{ 14, Cornhill, E.C., and Wimbleton-park-house, Wimbleton, S.W.	Wilson, George	{ 59, Threadneedle-street, E.C., and 23, St. Mary's-road, Peckham, S.E.
Beckley, Robert Whittingham	5, Ludgate-street, E.C.	Wood, Humphrey Williams	{ 11, Denbigh-place, Belgravia, S.W.
Brown, David	19, Bucklersbury, E.C.	Wood, James Templeton, M.A.	{ 24A, Gresham-street, E.C.
Capel, James	{ 5, Throgmorton-street, E.C., and 62, Westbourne-ter., W.	Wright, Anderson	{ 29, Great St. Helen's, E.C.
Chandler, Thomas	1, Bank-buildings, E.C.		
Clode, Nathaniel	{ 73, Avenue-road, Regent's-park, N.W.		
Coles, Wm. Fletcher ...	5, Aldermanbury Postern, E.C.		
Conisbee, Walter	{ 18, Webber-street, Blackfriars-road, S.		
Coombs, Thos. Merriman...	{ 13 & 14, Ludgate-st., E.C., and Clapham-common, S.		
Craddock, John Chase	{ 16, Bishopsgate-st. Within, E.C.		
Curtis, Robt. M., LL.D.....	{ 6, The College, Doctors'-commons, E.C.		
Dahlke, Julius G.	{ Hereford-lodge, Old Brompton, S.W.		
Daw, George Henry	57, Threadneedle-st., E.C.		
Dixon, Thomas Ogden	Steeeton, <i>via</i> Leeds		
Drew, Richard	9, Mincing-lane, E.C.		
Eamonsen, Joshua James...	{ 11, Dowgate-hill, E.C., and 2, Richmond-terrace, Hackney, N.E.		
Engall, Thomas	15, Euston-square, N.W.		
Foster, William Watson ...	{ 157, Fenchurch-street, E.C. and Felling Chemical Works, Newcastle-on-Tyne		
Garland, Robert	Belfiori-lodge, Highbury, N.		
Gibson, Henry	113, Lower Thames-st., E.C.		
Gladstone, W., F.R.G.S.	57½, Old Broad-street, E.C.		
Gray, John William	114, Fenchurch-street, E.C.		
Grimswade, Charles	3, New Earl-street, E.C.		
Harris, Henry	34A, Moorgate-street, E.C.		
Harrison, John	{ 2, George-yard, Lombard-st., E.C.		
Hayward, T. Carlyle, jun.	3, Highbury-park North, N.		
Henderson, Henry	1, Gutter-lane, Cheapside, E.C.		
Hills, Thomas Hyde	45, Queen Anne-street, W.		
Howes, M. H.	{ The Elms, Bedford-park, Croydon, S.		
Hudson, G. F.	{ 23, Bucklersbury, E.C., and Borough-heath, Epsom.		
Jerrard, James Thurgar	163, Fenchurch-street, E.C.		
Johnstone, William	{ 48, Gresham-street, E.C. and Ladywell-cottage, Lewisham, S.E.		
Jones, Richard	{ 30, Botolph-lane, E.C., and 1, Belmont-vil. Richmond, S.W.		
Killick, Joshua Edward	7, Ludgate-hill, E.C.		
Lukyn, Edward	35, New Broad-street, E.C.		
Macdonald, Alexander ...	3, Rotunda-place, Aberdeen.		
Munday, Charles	86, Snow-hill, E.C.		
Norbury, John	{ 5, Throgmorton-street, E.C., and 30, Gordon-sq., W.C.		
Ogston, George Henry ...	22, Mincing-lane, E.C.		
Parfitt, William	{ 2, Stanhope-pl., Mornington-crescent, N.W.		
Payne, Charles	56, Old Broad-street, E.C.		
Porter, Robert	12, Billiter street, E.C.		
Shakespeare, William	10, Austin-friars, E.C.		
Smith, James	{ 69, Coleman-st., E.C., and 21, Duke-street, Edinburgh.		
Southgate, John	76, Watling-street, E.C.		
Stapleton, Jas. E., jun. ...	{ 62, Cannon-st., E.C., and Mayville-lodge, Lee-park, S.E.		
Tomlin, James	{ Haringay-park, Hornsey, N., and St. John-square, Clerkenwell, E.C.		
Walker, Thomas Collier.	Saint Luke's Hospital, E.C.		

The following candidates were balloted for and duly elected members of the Society :—

Bally, Otto	{ (Messrs. Arles Dufour & Co.), 41, Threadneedle-st., E.C.
Cameron, Capt. W. Ogilvie.	{ Langbourne-chambers, 16½, Fenchurch-street, E.C.
Cave, Rev. Thos. Wells...	53A, City-rd., Finsbury, E.C.
Dowson, Joseph E.	{ 38, Dowgate-hill, Cannon-street, E.C.
Groombridge, Henry	5, Paternoster-row, E.C.
Groombridge, Richard ...	5, Paternoster-row, E.C.
Hodgkinson, S.	43, Threadneedle-street, E.C.
Hooper, B.	43, King William-st., E.C.
Judson, Henry	{ 10, Scott's-yard, Bush-lane, E.C.
Killy, C. O.	52, Bread-st., Cheapside, E.C.
Lambert, Henry T.	74, Grosvenor-street, W.
Mavor, William	77A, Park-st., Grosvenor-sq. W.
Meeson, Richard	{ Duvals, Gray's, Essex, and 8, George-yard, Lombard-st., E.C.
Mourant, Edward	Samarès Manor, Jersey.
Noble, George	{ 4, George-yard, Lombard-st., E.C.
Noble, Joseph Alfred ...	{ 4, George-yard, Lombard-st., E.C.
Ponton, T. Fox	153, Cheapside, E.C.
Worth, Charles Jones ...	{ City Bank, Threadneedle-street, E.C.

The Paper read was—

ON THE RELATIVE MERITS OF THE DIFFERENT SYSTEMS OF WORKING METALLIC MINES AND COLLIERIES.

By H. C. SALMON, F.G.S., F.C.S.

The relation between the industrial and political greatness of these islands and their mineral resources is too evident to require pointing out. Without our coal and iron—our copper, lead, and tin—our present industrial position would have been unattainable by any amount of skill or enterprise.

Among the mineral resources of Great Britain, coal and iron occupy by far the most important position, their value (estimating the coal at its price at the pit's mouth, and the iron as pig-iron) having been, in 1860, nearly seven and a half times as great as that of the produce of all the metallic minerals put together, estimating this metallic produce at its value after being smelted. The exact values were :—Coal, £20,010,674; pig iron, £12,703,950; total value of coal and iron, £32,714,624. Value of metals produced from metallic minerals, £4,406,694, including copper, tin, lead, zinc, silver, and other miscellaneous metalliferous products.

But although the produce of our metalliferous mines seems small in comparison with that of our great coal and iron districts, it is not only still considerable in itself, but its value to the industry and trade of the country is even greater than appears from the figures at first sight. The annual out-turn of metalliferous minerals, producing metals to the value of four millions and a half, is not only a direct addition to the wealth of the country to that extent, but, coupled with our other mineral resources, it has had the effect of making this country the great centre of certain

branches of metallurgical industry—a metallurgical metropolis, so to speak, to which ores are sent from every quarter of the globe, upon which our commercial and metallurgical industry realise their due profits.

In taking a brief review of the systems of working by which these great sinews of British industry are discovered and wrought, so as to be available for our use, which I propose doing this evening, I need scarcely say that I shall studiously avoid details, and confine myself, as nearly as possible, to giving a popular exposition of the general principles upon which the practical working of metallic mines and collieries is carried out, so far as the time at my disposal will permit me to do.

In comparing the modes of working metallic mines and collieries it is necessary, in the first place, to consider the main distinguishing conditions under which the mineral deposits occur in either case. It will be sufficient, for my present purpose, to refer to two of these. The first, as to the position, with reference to their containing rocks, of the lodes or beds in which the minerals sought occur; and the second, as to the distribution of the minerals in these lodes or beds.

Now, as to the first point, the position of the lodes or beds, with reference to their containing rocks, it may be laid down, as a statement of a general fact, in this country at least, that the combustible minerals occur in beds approximately horizontal, interstratified with other beds; while the metalliferous minerals occur in lodes generally vertical or inclined at a considerable angle to the horizon, usually cutting through the rocks which they traverse. Beds of coal and its allied minerals are, in fact, sedimentary deposits contemporary with their containing rocks, while metallic lodes are of an origin long subsequent to their containing rocks, and are due to causes which science has yet failed to elucidate. I need scarcely say that, in stating that deposits of combustible minerals usually occur in beds approximately horizontal, and the metalliferous minerals, on the contrary, in lodes more or less vertical, I only profess to give a popular notion of their common mode of occurrence in this country. In numerous localities, particularly on the Continent, beds of coal are thrown, by the contortions of the strata, into positions more or less vertical, and metalliferous deposits, on the other hand, sometimes take a position nearly horizontal, and even, at times, are found in beds interstratified with their containing rock.

The second distinguishing condition—that is, the different modes in which the minerals sought for are distributed in their beds or lodes, is, in the cases of coal and the metalliferous ores, even still more characteristic than the first, for it is connected with their geological origin. The combustible mineral, being of sedimentary origin, partakes of the comparative regularity of such deposits. The metalliferous ores, on the other hand, having been introduced into the rocks long subsequently to their formation by the operation of geological causes, highly obscure and, probably, equally complicated, usually occur with an irregularity which has hitherto defied the ingenuity of man to reduce to any general laws, and which has rendered this class of mining so eminently speculative. This distinguishing condition of comparative regularity in the one class of mining, contrasted with the widest capriciousness of distribution in the other class, stamps the mode of working to be adopted, in either case, with distinctive features, which must be always borne in mind if we wish candidly to compare the respective merits of the two systems. In metallic mines, where the deposits of valuable ores occur so irregularly—but which deposits, when found, are so valuable—the primary object is research. The removal, in the most economical manner, and with the least waste, of the ore discovered, is, of course, an important consideration; but it is decidedly secondary to the proper prosecution of works of discovery. In collieries, on the other hand, works of research are of secondary importance, the primary object being the economical and safe removal of as large a proportion as possible of the coal, the quan-

tity of which is approximately known in most districts. Having a pretty large acquaintance with the various mining districts of the United Kingdom, and of some foreign countries, I have been greatly struck with the very different type of character which is required for successfully carrying out metallic mining and colliery mining. In the one case the essential problems to be solved are quasi-geological; in the other they are mechanical and engineering. The true metallic miner acquires, by constant practice, coupled frequently with a certain natural aptitude, an instinct—it really is but little else, being indescribable and undefinable—for the search for metallic ores, which has a value beyond all price. The possession of this acquisition is quite compatible with a general confusion of ideas on any other subject; and, in fact, it is not unfrequently developed in the highest degree in men who possess anything but clear minds—who, indeed, are quite incapable of sustained reasoning. In many metallic mining districts I have observed two types of men, the result of whose career has been very different from what a cursory observer might expect. The one would be a man of large mind, considerable abilities, and an accurate reasoner. Such a man would be an excellent engineer and a good man of business; his works, under and over ground, would be laid out skilfully and economically, and the cost of everything would be known to a fraction; yet, through a long life of industry, he would be found decidedly unsuccessful. The other would be a man of a confused mind, rarely capable of giving a reason for what he did; a bad engineer and a muddling man of business. The mechanical appliances and arrangements in the mine, and at the surface, would be badly and wastefully laid out; and as to knowing the cost of the respective operations, you would generally find that the notion of estimating them had never entered into his head; yet this man would be successful where the other failed—the reason being that he possessed that peculiar mining instinct which the other, notwithstanding his superior general ability, was deficient in. The want of a clear mind, and the absence of business capacity and engineering skill, are no doubt drawbacks, but they are trifles in comparison with the possession of that indefinable knowledge, which will enable one man to discover rich bunches of ores, where the chances are the other will wholly fail. In prosperous metallic mines the courses of ore are so rich—when found—that even a considerable percentage of cost in breaking the ore and bringing it to the surface is not so very material. The great point is to find the ore, and the man who can do that best is fittest to manage a metallic mine, even if, in making the ore available when found, he should spend fifty per cent. more than another.

These reasons, the force of which are not, I think, generally appreciated, coupled with the great uncertainty and irregularity of all metalliferous deposits, will, I believe, always render metallic mining inferior in its mechanical dispositions to colliery mining. Except in some extraordinary exceptional cases, it is very rare indeed that we can see our way for more than five years. An extensive mining sett may, of course, be worked successfully for scores of years, but this will generally be by a series of new discoveries, each usually requiring distinct working appliances. Consequently, as mining is a business pursued for the purpose of making money, prudent men hesitate to incur large expenses or outlays of capital for the object of making a small saving on the working of a deposit of ore, which may itself disappear in the course of a short period.

UNDERGROUND WORKING OF MINES.—The systems of underground working, in metallic mines and collieries, thus depend upon two principal causes—the angle which the beds or veins make with the horizon, and the regularity or otherwise of their mineral contents. Indeed, the latter condition is of very general application, for all mineral deposits may be classed, for the purpose of working, according to the amount of sterile or gangue matter they

contain, which may be used for the purpose of filling up, to some extent, the excavations made by workings, so as to support their walls or roofs. In the case of metallic mines, the proportion of this sterile matter is generally sufficient, with the aid of a certain proportion of timber, to secure the walls of the lodes sufficiently, particularly when the dip or "underlie" of the lode is such as to aid their standing. In the case of collieries, where the bed of coal is generally nearly horizontal, and where, besides, it consists wholly of valuable mineral, any attempt to remove the whole, or even a great portion of this, must be accompanied by a fall of the roof. Consequently, the difficulty of working collieries, so as to secure a considerable proportion of the coal, and at the same time to avoid accidents; to keep the works open, and not to prejudice the working of other parallel seams; is much greater than those unacquainted with the subject would be apt to suppose. Indeed, in the whole range of the art of mining, there is no problem so difficult, and certainly none more important. Controversies have raged on the subject, and wide diversities of opinion and practice still exist, and probably ever will exist. For my own part, I have little faith in any general rules, as applied to the carrying out of operations of this nature. The conditions vary so widely, in different districts and different mines, that it is only natural to expect a corresponding variety of practice; and, after all, it is only the judgment and experience of the manager that can properly decide what mode is best applicable to his own works.

The drawing on the wall will give a general idea of how the underground workings of metallic mines are carried out. In the first place a shaft is sunk from the surface, either on the inclination of the lode, or vertical, so as to intersect it at a given depth. From this, levels are extended on the course of the lode, generally at regular intervals, varying from 10 to 15 fathoms, for the purpose of exploration. At certain intervals in these levels, generally from 20 to 40 fathoms apart, small interior shafts, called "winzes" in Cornwall, Devon, and in portions of Wales, and "sumps" in other districts, are sunk from level to level, partly for the purpose of exploration, and partly for the purpose of ventilation. When the ground is "laid open" by these levels and winzes, any ore ground met with is worked away, the stuff being allowed to fall into the level beneath, whence it is trammed to the shaft and drawn to the surface. The excavations left by the removal of the ore-ground are secured by timber, and the poor and waste part of the lode. The working away of ore-ground in metallic mines, consequently, rarely presents any real difficulties. When the lode is very large and rich, or when the rock containing it, or the "country," as it is technically called, is soft or "heavy," the working is sometimes attended with trouble, and always with considerable expense for timber. But there are rarely any serious difficulties, and on the whole the working away of ore-ground in metallic mines is not for one moment to be compared in difficulty with the working of coal.

As I have already stated, the modes of working coal vary almost infinitely, and have been, and are still, the subject of most lively controversies. The system most generally adopted is that of the "pillar and stall," or "board and pillar," which consists in working away a certain portion of the coal in the first instance, leaving the remainder in pillars sufficient to support the roof, which are to be permanently lost, or totally or partially removed at some future time. As Mr. Hedley says, in his work on "Colliery Mining," it is the form of these pillars, and the proportion of the coal eventually to be obtained, which cause so much controversy, and in which are involved such momentous interests, not merely for individuals, but for the future of the nation. Where this system is adopted with the eventual design of removing the whole, or nearly the whole of the pillars, the proportion of the coal got in the first instance is made chiefly to depend on collateral considerations, being varied principally

to suit the nature of the roof, the character of the coal for working, and not unfrequently the requirements of other parallel seams. The present system of working large collieries is to "cut out" the seam worked in this manner, of which a notion may be formed from the drawing, from the shaft to the boundaries, and then, working backwards from the boundaries to the shaft, to remove the pillars in whole or in part. In those portions where the pillars are removed, the roof falls in, and the "goaf" is formed. This goaf, or abandoned part of the mine, is really the great danger with which colliery workings have to contend; it cannot be ventilated, and becomes consequently the receptacle of noxious and dangerous gases. The main object is to cut off the goaf as much as possible from the other workings of the mine, and, consequently, the system now generally adopted, of first cutting out the coal to the boundary, and taking away the pillars from thence, by which the goaf is left entirely behind, is a great improvement upon the old system, where a goaf was sometimes made in the middle of the workings, thus forming an enemy in the rear, cutting off retreat between existing workings to the shaft.

TRANSPORT OF THE MINERAL PRODUCE AND MINERS TO THE SURFACE.—This is a vast subject, upon which, however, I shall say little. For the reasons I have given—and I think they are valid reasons—the system of transporting minerals underground, and raising them to the surface, are less perfect in metallic mines than in collieries. The commonest system of drawing in metallic mines is by the "kibble," which is nothing more than an iron bucket attached to a chain or rope swinging free in the shaft, without any guides whatever. In inclined shafts, one side has to be planked all the way down for it to drag upon. Such a mode of drawing was suitable enough, no doubt, to the days when only horse "whims" or "gins" were in use; but now that steam is universally employed for drawing from any depth, it seems to me that their use is not to be defended. Yet I am sorry to say that in most of the Cornish mines, including some of the very largest, they are still exclusively used. They are gradually giving place, however, to the "skip," made of wrought iron, and working in guides, which is undoubtedly an immense improvement. In justice to the managers of the mines, I must, however, state that the introduction of skips generally necessitates the "cutting down," or enlargement of the shafts hitherto in use, which is a very costly matter, and one which is not infrequently either impossible from financial considerations, or unadvisable for other reasons, such as a proximate termination of the lease. Under no circumstances do I apprehend that the systems of drawing or winding will ever be so perfect in metallic mines as in collieries. The shafts, except in a few rare instances, being necessarily sunk originally for the purposes of exploration, and being made to follow the varying dip, or "underlie," of the lode, can never afford the same advantages as those sunk vertically for the special purpose of working. Not but that I expect the systems of drawing in use in metallic mines will gradually improve, for which there is certainly scope enough; but I think, from the nature of the case, collieries will always lead the way.

In collieries, as everyone knows, the workmen are lowered and raised by the same means as the coal is raised. In metallic mines, on the other hand, except in a few where "man engines" are in use, the men have to descend and ascend by ladders. The waste of labour which this involves in deep mines—mines from 150 to 300 fathoms deep—is enormous, leaving out of the question the injurious effect it has upon the health. There is, I believe, no possible labour to which a man can be put more exhausting to the system than the climbing of a deep mine by ladders. In fact, nothing but habit could enable a man to do it. For depths of 100 or 150 fathoms, the task is not a serious one to a person accustomed to climbing, but depths of 200 or 300 fathoms are trying to the strongest men. The task of climbing from the bottom of Wheal Vor, for instance, a depth of 323 fathoms from the sur-

face, is really, for the labour expended, only to be compared to scaling some Alpine mountain, and to place such a task before a man after a day's work is clearly preposterous. As a matter of fact, in the deep Cornish mines not provided with man engines, only young, and consequently inexperienced, men can be found to work in the very deep parts. Experienced men—experienced as workmen, and also experienced as to the necessity of husbanding their strength, and not wasting it wantonly like boys—cannot be got to work in very deep places, at least if times are at all good and work plentiful.

But while one admits the evil, it is not so easy to suggest a remedy. Where the circumstances admit, or justify the employment of man-engines, they are employed, but yet there are not above eight or nine of them in the kingdom. The great desideratum would be to employ the same means as are used for raising the ore, and many schemes of this kind have been suggested, called "safety skips." There is a feeling among many agents in Cornwall that such machines might, with a reasonable degree of safety, be employed. But none have yet dared to incur the responsibility of adopting one, for if a serious accident were to occur, and the public mind became excited, a manager who adopted an innovation of this kind, might find himself in a very serious position.

VENTILATION OF MINES.—The air in mines, of whatever nature, soon becomes vitiated from various causes. The vitiation, however, principally arises from causes which may be classed in two categories: the subtraction of a portion of its oxygen by the respiration of the workmen, and the combustion of the lamps or candles; and the introduction and mixture of other gases discharged from the cavities of the neighbouring rocks, or arising from the decomposition of contiguous substances. In the case of metallic mines generally, the vitiation of the air is due almost entirely to causes of the first category—that is, the subtraction of the oxygen by respiration and combustion, coupled with the intermixture of any gases arising from the gunpowder used in blasting. In certain cases the air of metallic mines is corrupted by other causes, but these are exceptional, and speaking generally, one may say that, except in a very minor degree, the vitiation of the air of metallic mines is due entirely to the abstraction of the oxygen by respiration and combustion—just as the air of this room would become vitiated from similar causes.

With the combustible minerals, particularly coal, the case is very different. The same causes which vitiate the air of metallic mines are also in action here, abstracting the oxygen; but to these are added causes of the second category, arising from the introduction and mixture of other gases produced from coal, of a much more dangerous character. The principal of these gases are:—

Carburetted hydrogen, or "fire-damp," so fatally dangerous from its explosiveness. When mixed with atmospheric air in a less proportion than one-thirtieth, no effect is observable. When mixed with air in a proportion varying from one-thirtieth to one-fifteenth, the flame of a candle or lamp, lengthens and enlarges in proportion to the quantity of gas present. Those experienced in the matter can judge pretty accurately of the quantity of gas present by the state of the flame, and suspected workings are "tried for fire-damp" by this means. When the proportion of gas reaches one-fourteenth, the flame will propagate itself, but without any violent explosion. Above this point, the inflammability of the gas increases rapidly, up to between one-ninth and one-eighth, in which proportion the mixture arrives at its maximum explosive power. As the proportion of fire-damp increases beyond one-eighth, the mixture becomes less and less explosive until it reaches one-third, at which point it ceases to fire, and extinguishes the lamp. This gas is not in itself poisonous or destructive of life, unless where it occurs in such considerable quantities as not to leave sufficient atmospheric air to supply the oxygen necessary for respiration.

Carbonic oxide is a gas even more highly explosive than fire-damp, and, unlike the latter, is poisonous and fatal to

life in the highest degree. There can be little doubt that this terrible gas has caused a much greater loss of life than is generally supposed, by poisoning suffocation, it being calculated that 1 per cent. is fatal to animal life. The common notion, founded on the experience of carbonic acid gas, that where a flame exists life is also safe, does not apply to it, for in certain mixtures with atmospheric air a flame will burn without explosion, yet life be instantly destroyed. Mr. Dickinson, the Government inspector of the Manchester district, mentioned a case which occurred two years ago, within his own knowledge, in South Wales, where a large number of men and boys were killed, with lamps and candles burning in their hands, by gas which caused no explosion. He also mentioned a case where he himself helped to carry two men out of gas when their safety lamps were burning. Poisoning suffocation of this kind may, however, also be due to sulphuretted hydrogen, another highly poisonous gas.

Carbonic acid gas, or "choke-damp," forms in every class of mines as a result of respiration, combustion, and the blasting of powder. In coal mines especially, however, its great danger is as a resultant from the explosion of the fiery gases already named. Many, in numerous instances, only escape the explosion to be suffocated by choke-damp. When atmospheric air contains upwards of 8 per cent. of the gas, it becomes dangerous to human life. As the effect of this gas on the system is to a certain extent poisonous, its presence, in ill-ventilated mines, gradually undermines the constitution, even when in quantities so small as to exclude all danger of suffocation.

Such are the enemies with which miners have to contend. In the case of metallic miners the dangers are less striking, although for that very reason they may be more insidious; for there bad ventilation only kills gradually, and the mine-manager has no apprehension of an explosion which may draw upon him the scrutinising eyes of the kingdom in no very friendly spirit. But the position of a colliery—particularly one with a fiery seam—is one of constant danger and anxiety, at any time liable to a terrible accident which no one can guard against. As an instance of the terrible explosive power which may be generated by the production of these gases from apparently insignificant quantities of mineral, I may mention the case of the Hetton Colliery explosion, which was one of extraordinary violence. Mr. J. L. Bell estimated that the quantity of gas which caused it (which, from peculiar circumstances, was ascertainable) might, if carburetted hydrogen, be generated from 152lbs. of coal—or, if carbonic oxide, from 49lbs. of coke. He added, that the explosive force of this quantity of either gas would be equal to about 75 quarter-barrels of gunpowder, each barrel being 25lbs. This may help those unacquainted with the subject to realise the extent of the explosive matter hoarded up in our coal seams.

The general principles upon which the ventilation of all mines is carried out are essentially the same as those with which we are familiar in the ventilation of public buildings. They all rest on the well-known doctrine, that as we heat air we lessen its specific weight, or, in popular terms, we rarify it, so that it will ascend and replace the cooler air above it, and *vice versa*. As the temperature of the rocks, at a small depth below the surface, is not affected by the atmospheric variations of temperature, it follows that in winter they are warmer and in summer colder than the atmospheric air, and the consequence is, that if a mine has two openings, one more elevated than the other, a natural circulation will arise by which in winter the air will enter at the lower and escape at the higher opening, and in summer enter by the higher opening and escape by the lower one. This would be the case if the temperature of the mine were the same in every part, but in a mine which is working this would never be the case, and, consequently, if even there were no difference between the levels of the two openings, currents would be created, and a natural ventilation result. In the case of metallic mines it is only necessary to open out

the ground by levels and winzes to create this natural ventilation, which experience has proved to be the best of all others. As the movements of the air caused by variations of temperature take place in a vertical plane, metallic lodes—being approximately vertical—easily maintain a natural ventilation. Sometimes in mines of this character, particularly in driving long levels upon which an air-shaft cannot be sunk, recourse is had to artificial ventilation, but in good mining this is only regarded as a temporary expedient, the end and aim of good management being to open out the mine as soon as possible, so as to get a natural ventilation. In driving long levels with but one air-shaft, a mode of ventilation is sometimes resorted to, as shewn by the drawing. The bottom of the level is covered with an air-tight “sollar,” which extends nearly up to the forebreast of the level, and between the mouth of the level and the air-shaft an air-tight door is placed. The air in the level, heated by the combustion, &c., rises up the shaft and escapes, being replaced by fresh air, coming in under the solar, and passing in front of the forebreast. If there were no solar, the heated air would equally rise in the air-shaft, but then the current of fresh air coming in through the level would not have extended beyond this shaft, and would, consequently, not have aided in ventilating the forebreast of the level.

Although the natural circulation of the air, arising from the cause I have mentioned, is sufficient for effective ventilation in the case of metallic mines, it is not so in the case of the generality of colliery workings. The openings for the purpose of “cutting out” the coal being, generally speaking, made in a plane more or less horizontal, there evidently is no possibility of having the same natural ventilation as in the case of metallic mines opened out in an approximately vertical plane. Consequently, there must be artificial means of stimulating the circulation of air.

THE FURNACE.—The natural circulation of air in mines being influenced by differences of temperature, the most obvious mode of stimulating this circulation would be by increasing these differences artificially. If in the case of the air-sollar, already described, a fire were placed at the bottom of the air-shaft, it is evident that the circulation would be stimulated enormously, and in proportion to the depth of the shaft. This is the principle carried out in the ventilation of collieries when a furnace is employed. Distinct modes of exit and entrance for the air having been arranged, either by means of two separate shafts or by one shaft divided into two air-tight compartments by a brattice, the furnace is placed at, or as near as convenient to, the bottom of the shaft through which the air-current is to ascend, or the “up-cast” as it is called. The impure air which is withdrawn from the workings by this “up-cast” shaft, is replaced by pure air from the atmosphere which descends through the other, or “down-cast” shaft. The mode in which these furnaces are sometimes placed in the mine is shown by the drawing. I need scarcely say that the details of their arrangement, so as to cause as little inconvenience as possible at the bottom of the shaft, and to insure their being fed by air free from explosive gases, are various in the extreme, and require the exercise of the greatest judgment.

MECHANICAL MEANS.—The other mode of artificially stimulating ventilation consists of the application of mechanical means for drawing out the air. The machines hitherto used for this purpose have been of two kinds, one being essentially an air-pump, and the other a centrifugal fan. Time will not permit me to enter into the respective merits of these different contrivances; but, with regard to the respective merits of the furnace and mechanical appliances of any kind, I may state that the mining world is much divided on the question. For shallow pits mechanical means are, undoubtedly, better, although, like most things in this world, they present various practical difficulties.

The ventilating current being produced by either of

these means, it remains to regulate it, and distribute it through the workings so as most effectively to remove and dilute the noxious gases. It would take a volume to discuss, even in a general manner, the problems which are involved in carrying out this operation. The rate at which the currents should be made to pass—the area and extent of the air-courses and their resistances—the splitting of the currents, by which the quantity and quality of the air is improved, and the different divisions of the mine to a certain extent isolated, so as to minimise the danger in case of an explosion in any one division—are some of the most important. The drawing will give some notion how these matters are carried out in their simplest form.

Another principle of ventilation, which is as old as mining, and which has always been more or less practised, is to drive fresh air into the remote workings, instead of drawing out the vitiated air. There are circumstances where this may be usefully practised, but it has been demonstrated over and over again, that it is attended with great loss of power, from the well-known laws of pneumatics.

I have thus endeavoured, rather discursively I am aware, to give a general notion of the leading conditions affecting the working of mines. That they are conditions attended with enormous complications and difficulties, I think every one must admit; and that consequently those who carry out the working of mines are entitled to a reasonable amount of forbearance and consideration. Of every class engaged in industrial pursuits, mine owners are the most liable to casualties and accidents, against which no foresight or prudence can provide. They are liable to equal, if not greater risks, than the shipowner, without his power of insurance. To them serious accidents frequently mean ruin, and consequently it is absurd to suppose, as some seem to do, that mine owners are indifferent, if not callous, to accidents. It is undoubtedly the duty of the government to interfere to protect those who are liable to great dangers; and in most countries indeed it is held that the mineral property of a nation, being of an exceptional character—being a capital which once consumed can never be supplied—should be entirely administered by the State. However much such a notion may now seem repugnant to our ideas, it is by no means improbable, in certain districts at least, that some such arrangement must be ultimately resorted to. The majority of our collieries are worked on short leases, and under such circumstances it is unreasonable to expect works to be carried out in the style of those of a railway company. The building-lease system of London does not encourage a very permanent class of erections, so what can be expected in the case of twenty-one years' leases? Many landowners care little about the prospects of posterity, but make such arrangements as will ensure the largest present income—and lessees must act accordingly. If foreign Governments interfere incessantly with the working of mines, at least they protect them from grasping terms, which can only be complied with by a system of working injurious to the future; and they give a security for the investment of adequate capital, by insuring a continuance of a concession as long as certain defined terms are complied with. I have no objection to see Government interference, in the case of mines, largely increased; but I am satisfied it can only be usefully done by beginning at the beginning.

DISCUSSION.

Mr. G. R. BURNELL said they were much indebted to Mr. Salmon for bringing the whole subject of mining before them in the very agreeable way he had done, but he felt that the comparative merits of metalliferous mines and coal mines had scarcely been sufficiently dwelt upon. There were conditions affecting the two classes of mines which he thought it desirable for practical men to place before the world somewhat more in detail than had been done at present, so as to get rid of some of the misconception prevalent among the public. There was another

matter which he should have liked to have heard discussed, viz., the great increase of the temperature which occurred in proportion to the depth to which these great metalliferous mines were obliged to be worked. That was a question which bore very importantly upon the comparative rates of mortality amongst miners. Then, as regarded the question of coal mines, he regretted that Mr. Salmon had not alluded to the great subject which must be present to the minds of all classes—the late sad accident at the Hartley mine. That accident had naturally excited a great deal of feeling on the part of the public, who, under the inspiration of unpractical writers, were calling out loudly for the adoption of a uniform system of making two shafts to every mine. It was also important in these matters, that the public should be made aware that there was no universal law which could be laid down as rigidly applicable to every case. In the case of the Hartley mine, there could be no doubt that two shafts would have prevented the fearful loss of life that had occurred, but there were cases—as for instance in the mines near Whitehaven, where the workings were carried under the sea—and where it was impossible to have two shafts. All these cases, therefore, required to be treated upon their special merits, and no universal law could be laid down, and hence arose, in his opinion, the danger of Government interference. Government Inspectors, who had large districts to survey, could not spare the time to examine carefully all the practical details necessary to be known before any universal law could be laid down. They could only lay down general rules, and the effect of these general rules might be, as was the case on the Continent, to destroy the mining industry of the country. The result of Government interference in France had been what he had stated. Formerly there was a very important mining industry in Brittany—nearly as valuable as that of Cornwall—but at the present day it scarcely existed. In France no man could open a mine without a concession from the Government. The plans for the working must be sent in to the government, and the engineer was called upon to explain the workings from time to time. No miner was allowed to work without a species of examination. All this “cribbed-cabined and confined” the mining industry of a nation, and the practical result was that whilst they were very careful to protect the lives of the people in one way, they would not allow them to gain a living in the other. In his opinion the common sense of the matter, as far as law could interfere for the prevention of accidents, was to make the persons who got the greatest benefit from mining operations responsible in purse and in person for the accidents which might arise. They talked of the impossibility (with a lease of 21 years) of enforcing a proper and costly execution of the work. To his mind that was no excuse, for if the landowner got the benefit, he ought to be made to pay the consequences of his unjust pressure on the people who took a lease under him. Then, again, he believed there were many casualties which might be prevented if the managers and engineers of mines had a proper sense of their own responsibility, and this brought him again to the case of the Hartley Colliery, where the accident, as they knew, occurred from the breaking of the large balance beam of the lofty engine. A balance beam of that size ought, in his opinion, never to be made of cast iron, and certainly ought not to be worked over the only shaft of the mine, and therein he thought the engineer was to blame. Further, a shaft of that description ought never to have been entrusted simply to a wood curb. The brattice was knocked away, the curb failed, and the ground at the back of the curb fell in. If that shaft had been lined with fire-brick or stone the accident would not have happened to the serious extent it did. He did not believe Government inspectors could do much. Inspectors could not lay down laws to suit all cases, and they could not always see that their instructions were carried out. He was sorry to see, by the newspapers of the day, that a Royal Commission had been named to inquire into the

circumstances of the Hartley accident. He believed a commission was not the best means of getting at the truth of such matters. The proceedings were conducted with closed doors; the evidence was not necessarily taken down in shorthand, and the whole of the evidence might not be published. He felt that, in all cases of this kind, the most proper tribunal for conducting such an inquiry was a Select Committee of the House of Commons, where everything was done openly and came before the public.

Mr. E. CHADWICK, C.B., said, in respect to commissioners, the gentleman who had last spoken was wholly misinformed, or informed only by prejudice, as to the procedure, which, when properly conducted, was the reverse of that described. The question between parliamentary committees of inquiry and commissions of inquiry was between inquiries by persons of distracted attention, limited in time to two or three hours a day once or twice a week—persons who were irresponsible, and an inquiry by persons who gave undivided attention from day to day, and who inquired by themselves or their assistants on the spot. The practical value of conclusions and legislation was as the time bestowed in examination and preparation. The comparative results left no doubt of the relative value of the two procedures when the procedure by the commission was properly conducted. On the more immediate topics of the paper, he could only repeat the expression of his conviction on one point, that little progress would be made in mining improvement, until the whole cost, the cost in excessive sickness and excessive mortality, as well as the cost of materials in all mining adventures, were charged upon the adventurers or upon the commodity, as it was just they should be. Until the cost of ignorance of the waste and devastation occasioned by recklessness was thrown upon those who used ignorant service, due exertions would not be made to obtain educated labour, as well as superior scientific service. It was an important fact to be borne in mind that when the causes of accidents were closely inquired into by competent persons, the great majority of them were found to be clearly preventible, the results of empirical management, or grossly ignorant labour. In this field of industry, as well as in some others, nothing was so wasteful as ignorance. It was true that proprietors suffered from accidents, but not enough; not the whole cost regularly attendant upon them. A large proportion of it was thrown upon others. In such cases as the dreadful accident which had recently shocked the nation, it was not doubted, by persons practically conversant with the subject, that if instead of the great expense of disaster being borne by others, it had been borne by the mine-owners themselves, such enterprises would not be undertaken without double shafts, recommended years ago by a parliamentary committee as a means of prevention, and not costly as a means of ordinary working economy. On the occurrence of calamities from explosive gases, the cause was frequently assigned to the recklessness of the miner, a man who, to light his pipe, would suck the flame through the wire-gauze of the lamp, or poke a hole into the gauze with his pick. The gross ignorance of much of the northern colliery population was matter of general observation. The Cornish miners had a higher degree of education, and their operations were not attended with the same proportion of fatal accidents. A friend, who was highly conversant with mining operations in every part of the country, expressed a confident belief, that had the accident of the Hartley Colliery happened to a body of the better-educated Cornish miners, he was quite confident they would have worked their way out, for the distance to be cut through was stated to be not more than some thirty feet. Instances might be given of important changes worked out, where the interest in better educated service was given, by charging upon the adventurers the whole of the consequences, and where precautions of a higher order of efficiency were adopted. The case of the educated man (stated in the paper) was the case of the man of inappropriate education, who was beaten by the man of better

though empirical, knowledge, obtained by constant undivided attention, which knowledge he had not the art of expounding clearly. This principle would avoid the use of prescribed universal conditions. Competent inspection of the dangerous processes, combined with the principle of interest in the results, would occasion the inspector to be regarded as an ally, bringing the knowledge, derived from wide observations of experience, in aid of the owners' objects. There was an example in Lancashire of an association of the owners of steam engines, for the prevention of boiler explosions, whose mode of procedure was to engage an inspector of their own to go about and examine their several engines, and report on their defects to the owners of the engines, as well as to the Association. This was an example of the voluntary adoption of the principle of inspection, and of its services to owners, amongst other things in warning them against the mismanagement of their capital in their engines by their servants. Intelligent workmen, too, now began to appreciate the importance of independent inspection, and to seek it for their own protection.

Mr. P. H. HOLLAND took a different view from that of one of the previous speakers on the subject of Royal Commissions. His own opinion was, that such a tribunal, being for the most part composed of men selected from their practical knowledge of the subject, was the proper one to deal with matters of this kind. His own experience of such bodies enabled him to state that evidence was taken before a commission at 'greater length, and the witnesses were allowed to explain their views more fully and more deliberately, than before committees of the House of Commons. He was gratified to find that a gentleman of Mr. Salmon's large practical experience in mining took the view which he (Mr. Holland) had long entertained, that the best way of preventing accidents in mines was to make the persons who derived the profits responsible for the consequences of the accident. The question of two shafts in all mines was one which doubtless must in a great degree be regulated by local circumstances and conditions; but he thought the government inspectors ought to have power to order anything which was practically necessary, with a view to the prevention of accidents in mines. As the law stood at present, the inspector might give directions for a thing to be carried out, but he had no power to enforce it. What he would suggest was, that the owner should either be compelled to adopt the practical suggestions of the inspector, or refer the question to impartial arbitration. It was true, that under the present system an arbitration was provided for, but it could not be considered impartial. The owner had the power of nominating five persons, out of whom the Secretary of State selected one to arbitrate between the owner and the inspector. The owner would of course take care to nominate five persons holding the same view as himself, and, therefore, so long as the present system of arbitrating on these matters existed, there was little chance of the inspector's office being a practical good. In the case of the Hartley Colliery, if the inspector had ordered a second staple to be constructed between the upper and the middle seam, all the men except those killed by the fall of the beam would have been saved. But if the inspector had ordered it he knew he had no power to compel its being carried out, and such men did not like to be beaten. A little amendment of the law would remedy that matter, and he believed would effect a vast deal of good. There were two or three matters in the paper which he would briefly notice. The first was with regard to the annual addition to the wealth of the country from its metallic productions, which Mr. Salmon had estimated at $4\frac{1}{2}$ millions. From that should be deducted the cost of working, which might be taken at about three millions, so that the actual addition to the national wealth was reduced to about one and a half million, instead of four and a-half millions, and it should be borne in mind that the cost of working many mines was sometimes more than the produce from them realised.

They had been told that the miners in Cornwall had ventured to raise the men by machinery. He believed three or four man engines were employed, and they worked well, though they were rather expensive. Only one accident had taken place, and that was the man's own fault, and the managers of the mine could not be responsible for that. There was every probability that that plan would be more extensively used. They had been told that explosive gases, when not in sufficient quantity to explode, were not injurious to those who breathed them. That was not quite true, for all knew the effect of breathing the atmosphere of a room when an escape of gas took place; a headache certainly followed, and a headache showed that some injury to the system was taking place. He had no direct evidence to prove that breathing explosive gases short of choking was fatal; he had nevertheless no doubt as to its being injurious. After an explosion of gas in a mine it was well-known that a great number of people were killed, and it was generally assumed that carbonic acid gas was the destructive agent, but that was not always the case. The great cause, no doubt, was the absence of the oxygen of which the air had been deprived by the explosion, and the men were so to speak drowned. But there was another cause of death in mines more frequent than that. There was the effects of dust. This was found to be the case to a considerable extent in the case of the Riscar explosion, by which 140 persons were killed. On examination of the bodies of several of the sufferers, it was found that their mouths were full of coal dust, by which they had been literally choked, and it appeared that others had employed their handkerchiefs, or something of that kind, to keep the dust out of their mouths. Mr. Holland next referred to the subject of the men mounting by ladders, and remarked upon the instances of great physical exhaustion he had witnessed after men had reached the surface from a depth of 300 fathoms and upwards, and he then proceeded to speak of the effects produced upon the health of miners from working in badly ventilated mines. In some analyses which had been made by Mr. Hunt, it was shown that the air in some mines had been deprived of oxygen to an extent equal to one respiration through the lungs, and even more, and men were thus working in an atmosphere in which a candle would scarcely burn. He referred to the great prevalence of consumption amongst the metallic miners of Cornwall, which he attributed in a great measure to the impurity of the air they breathed, in contrast to the result upon the miners in the north, where the workings were better ventilated. In the better ventilated coal-mines, the deaths from consumption were not generally above the ordinary average of other occupations. He did not attribute those results to the influence of the metals upon the atmosphere of the mines, so much as to the want of proper ventilation, inasmuch as women and children employed in the manipulation of the metal on the surface, were not particularly affected by consumptive diseases.

Mr. Wm. HAWES said the paper they had heard read must have interested all present, but it struck him forcibly that, whilst it narrated a certain number of dangers to which miners were exposed—some producing sudden death and some a gradual death—there was a certain class of accidents which had been unnoticed, and it was not till he came to the end of the paper, that he understood how it was that a gentleman who had so perfect a knowledge of the subject, and had placed it before them in so pleasing a form, had omitted to notice that class of accidents which far more than any other were preventible. The last paragraph, however, explained the omission. It was clear that when accidents occurred from explosion, or where there was a gradual extinction of life by suffocation, they might be considered as almost unpreventible, whilst those arising from fracture of machinery, bad ventilation, or from ignorant arrangement of the ventilation, were all capable of remedy, and in the last paragraph he found Mr. Salmon urged the necessity of government interference to overcome many of the difficulties with which mining was at present surrounded.

He (Mr. Hawes) believed if there was anything more likely than another to increase those difficulties, it would be the admitting direct government action and interference with mining operations, as would be the case in any other branch of national industry. But they might have a certain amount of inspection over mines, as they had over factories and over the administration of the poor-laws. That the reasonable recommendations of the inspectors, if not attended to, should bring serious results to the owners, was one thing; but to appoint a body of inspectors to whom should be delegated the authority of saying a certain thing must be done, was taking out of the hands of a great industry of this country that power of independent action without which no industry could be successfully worked. Let him apply this to the observations of some of the speakers that evening. His friend, Mr. Chadwick, had told them that the colliers in the north were the most uneducated class, whilst the workpeople of Cornwall were the most educated class of miners. [Mr. CHADWICK—Comparatively.] But the gentleman who spoke last had told them that, so badly were the Cornish mines ventilated, so ill-provided were they with fresh air, so little interest did the owners take in the lives of their workmen, that the mortality amongst them was higher than amongst the uneducated and ill-provided-for colliers of the North. The contradictions of those two gentlemen indicated to him that they had not proper information on which to decide the question of interference one way or the other, and no man whom they might put upon the commission, unless he had served his time in the North and the West, was fit to deal with the question. Then they had placed before them various forms in which this interference was to take place. They were to have general orders. What did that mean as applied to mines? Then they were to have a tribunal of Inspectors, and an Act of Parliament to be enforced with penalties against the owners. These were other words for crippling an industrial energy, on which depended the mining interests of the country. He was quite of opinion that they could not throw too much responsibility upon men engaged in commerce of any kind; make them responsible for any inattention or wilful neglect, or want of proper care for the lives of the men they employed; and then everything that was required would be done in the best and most economical manner. They might apply the same rule to the managers of mines as was applied to railway directors, who were made responsible out of their own pockets, and the pockets of the shareholders, and they would thus have a direct interest in the prevention of accidents. He (Mr. Hawes), therefore, said, hold the owners responsible for any cases of gross neglect, and there would be greater care to protect their men against accident than would be the case under a system of Government inspection. He would add that he never lost an opportunity which presented itself of protesting against Government interference with trade; and whilst the great accident at the Hartley colliery enlisted the sympathies of the great mass of the people of this country, let them beware that such sympathies did not lead the way to a system of Government interference which would crush the best industrial energies of the nation.

Mr. WARINGTON SMYTH, F.R.S., begged to recall the attention of the meeting to the excellent paper of Mr. Salmon, because he thought the object of that paper had been misunderstood and was not fully appreciated. If they had attended more to the varying circumstances which that gentleman had placed before them, in respect of the differing conditions of mines, he thought a very great deal of discussion upon generalities might have been avoided. If that had been done they would not have heard so much said about having more than one shaft to every mine, or the unfair comparisons between the miners of Cornwall and the colliers of the north—if they had kept before them the facts which had been introduced to their notice in the paper. With reference to the numerous shafts in some of the Cornish mines, as mentioned by a preceding speaker,

it was to be recollected that many of them were mere drifts, principally undertaken for exploring purposes in metalliferous mines; there was not the certain dead expense which was attendant on the sinking of the main shafts of a coal mine, and it was frequently the case that portions of a shaft more than paid the expenses of the sinking; and Mr. Salmon had pointed attention to the fact that the entire work in a metalliferous mine was a continuous exploration. Therefore they could not look for that perfection of mechanical arrangement which they looked for in collieries, where the great expense of sinking a shaft having been once overcome, the mechanical appliances were of a character best adapted for raising large quantities of mineral with a due amount of profit. The paper embraced so extensive a range of subjects that he thought it was unfair to complain of the want of details, such as had been adverted to by one or two speakers, and they must also remember that upon those details a great amount of importance was to be placed which could scarcely be measured by having passed before them in review the general tendency of mining operations, the object of the paper being merely to present a comparison of the two methods adopted. But with respect to some of the observations which had fallen, he must say some very strong misapprehensions appeared to be entertained in respect of some of those points, amongst others, that in mines worked beneath the sea they could not conveniently have more than one shaft, and the mines in Whitehaven were instanced as an illustration of this. He would say, having examined those mines officially, they were doubtless worked under difficulties, but were nevertheless admirably ventilated, and as far as human prudence could foresee, were worked in a very safe and satisfactory manner; and although there might be some inconvenience in carrying a shaft through the sea, there might nevertheless be more than one shaft on the land. There were several other openings in the crop of the measures on the land, whereby the current of air produced was, in the main air-roads, almost enough to blow the spectator along. He might mention that, in Cornwall, there were several submarine mines near the Land's End which were worked under the sea at very considerable depths, and in those cases they were not satisfied with one or two shafts, but they sometimes had half-a-dozen, far more indeed than would be dictated by a prudent sense of economy, and which had been undertaken principally for the purposes of exploration. The paper had touched upon a great number of interesting topics, and he thought their thanks were due to Mr. Salmon for having placed before them the contrast of conditions under which the two classes of mines were worked. As regarded the last paragraph of the paper, it was an extremely suggestive one. Much might be said for and against governmental inspection. He had witnessed the gradual spread of that system—commencing with two commissioners, then adding two inspectors, who were again increased to six, and these subsequently to twelve, until they had them established in all parts of the coal mining districts of the country. He believed a considerable amount of good had been effected by those inspectors, not so much by their actually going down into the collieries and personally introducing improvement, but because it was known that they might come at any moment, and many things were put in order with regard to ventilation and mechanical appliances which would have lingered on for years unattended to, if the owners had not had the fear of the inspectors before their eyes. He believed the extent to which the great staple minerals of the country, coal and iron, were worked, made it more important for the nation at large to look carefully into the mode in which these matters were managed. That simple question of the dimensions of the pillars, as compared with the quantity of coal removed, might not only give rise to controversy, but it was one also of considerable national importance. In districts where fuel was of the highest value, there

were hundreds of acres of coal entirely destroyed, simply from the fact of those pillars not having been duly proportioned to the space of coal removed, and they could not regard this in any other light than as a national loss; but whether it was possible to introduce a supervision like that on the continent, was another question—nor did he say that he thought it would be desirable to do so. They had heard that evening of the appointment of a Royal Commission to inquire into the metalliferous mines, but he believed, unless great caution was exercised in some of these matters, as much harm as good might be done by the interference of Government, when it was not absolutely necessary. In consequence of the increasing depth and difficulty under which coal mines were worked, he thought it might be advisable that the government should exercise a supervision to see that the mine was not exposed to danger, and on the other hand that the coal was not improperly wasted. But on the subject of accidents, he would say, let them be very careful in distinguishing between accidents which might be termed unavoidable, and those which were the consequence of a neglect of due precaution, or the neglect of cautions given. They had confounded the two cases together too much. Cases of explosion from the want of sufficient ventilation, or from neglect of discipline and the breaking of an iron beam which was believed to be equal to a much greater weight than it had to bear, ought, he thought, to be considered in a very different light, and the latter was amongst those accidents which human foresight could not have avoided; but the objection that had been taken to a cast iron beam, as such, was so preposterous to those who were acquainted with the matter that he would not waste words on the subject. If they looked at the object of the paper, which was to point out the distinctions between the two systems of mining, he thought they ought not to be so hasty to blame, but that something was often to be said in extenuation on account of the many difficulties under which coal owners laboured; and from the experience he had had amongst the managers of mines, he could say there were very few indeed who were not grieved to the heart when loss of life occurred from accidents, and who did not take every reasonable precaution to guard against such accidents in future.

Professor TENNANT believed that the system of Government inspection had been the means of saving a great number of lives. With regard to the loss of life from casualties in many operations the average was about 800 per annum. He believed but for Government inspection that number would have been increased to 1,000; therefore, if 200 lives per annum were saved it was an important subject to be taken into consideration. With regard to the paper itself, it afforded matter for discussion for half-a-dozen meetings. Upon the subject of the mental condition of the working-classes in the mining districts he could bear his personal testimony to the improvement which had taken place in that respect within the last thirty years. Still there was plenty of room for further improvement in that direction. The elementary works published on mineralogy showed that there were as many as 250 specimens already discovered in this country, and yet, if they asked miners to tell them the number, they would not comprise, probably, more than 50 or 60. Therefore, if any mining population possessed a little more elementary knowledge of chemistry, mineralogy, and geology, it would add much to their own happiness and the welfare of those who employed them.

The CHAIRMAN said it was now his duty to propose that the thanks of the meeting be given to Mr. Salmon for the interesting paper with which he had favoured them. In doing that he felt it his duty to observe, that the object for which the paper had been expressly written had been most admirably fulfilled. Mr. Salmon had professed to give them a general view of the relative merits of different systems of working metallic mines and collieries. On a subject so comprehensive, and involving so many points, it was quite evident that nothing short of an encyclopædia

could fully carry out every detail, but he must do the author of the paper the justice to say that he thought he had, in a very admirable, clear, and concise manner, given perhaps as much information of a general character as they could expect from a paper read within the limits of time allowed. With regard to the various points embraced in the subject, if the hour had not been so late he should have been glad to have gone into some of them with a view of making one or two comments—not so much upon the paper itself, as upon some of the remarks which had fallen in the course of the discussion. Much had been said on the subject of commissions. Upon that point he might be allowed to speak with some little authority, having himself acted on a commission upon an important mining affair: and he must say that that commission and commissions generally, so far as he was acquainted with them, had been well adapted for obtaining a vast quantity of detail which could not by possibility be brought before a committee of the House of Commons. Then as to the remarks respecting the great importance of minerals, especially coal, that was a point which must be impressed upon the public in every possible way. The increasing depth and difficulty of working mines was such that it would undoubtedly force the subject very much upon public attention; and he thought great service had been done by Mr. Salmon in bringing forward a paper like the present one, so suggestive of those various matters which required consideration. Allusion had naturally been made to that most lamentable calamity at the Hartley New Pit, in Northumberland; and here he would take occasion to say that although every one now perceived that two shafts would have prevented the fearful results of that accident, yet it was impossible, in the nature of circumstances, that every precaution against such an accident could have been provided against, or its necessity foreseen. Without entering into any details upon the prudence or necessity of a second shaft (for he, no doubt, must admit that if a second means of communication had existed it would have been more prudent) he (Mr. Sopwith) must be permitted to say that the accident, by its extent, and by the singular nature of its occurrence, was removed out of the category of those which were within the ordinary range of foresight. Much had been said about the responsibility of the owners, and here he must observe (and he spoke from an extensive acquaintance with owners and other parties connected with mines) that when an accident had happened, he did not think a greater responsibility could well fall upon them, than that severe loss of property which they suffered, in addition to that severe affliction and heavy grief which weighed them to the earth. They must not call too loudly in such cases for additional punishment. They must take into consideration the situation of those who suffered the ruin of their fortune—who like the rest of their fellowmen felt most acutely the misery and distress such occurrences produced. He would only make one further remark on this subject. It had been said that the poor men might have worked their way out of the mine. Mr. Coulson, one of the most able and experienced men in this kingdom in the sinking of mines, was unable, with all the skill and energy of the most brave workmen, to work his way in; how then could it have been possible for those who were buried under the ruins to work their way out? Imagine a castle to have fallen. If those brave men could only move two or three feet, or perhaps as many inches, in as many hours, how was it possible for those who were buried in the cellars and vaults to work through the superincumbent mass of ruins. Many points had been alluded to in the discussion. He did not dislike the discussion the more because it had wandered a little from the point. He thought that was the object of a paper of this kind—to open out a discussion of the subject in all its bearings, and to obtain the opinion of different classes of minds upon it. He must, however, say a word as to the intelligence of miners in the north as compared with those in the south. Coal mining was for the most part a laborious quarrying operation, whereas working in metallic mines was of a kind to

excite thought and reflection, and it was for that reason that they found in metallic mines the workmen really more thoughtful and intelligent. It was stated that in metallic mines the only means of bringing the men out was by rough mechanical contrivances, and that in Cornwall they were bringing them up without the aid of slides. He could say in all the mines under his direction the workmen were brought out of the metallic mines by slides. Mr. Warrington Smyth knew that in no mines, whether coal or other, were the miners brought out in a more careful manner by the aid of the best machinery, than in the mines to which he had just alluded. Without, however, saying more upon these details, and even abstaining from a few observations which he wished to have made upon some larger matters of mining, he could not longer occupy their time, but would propose that they give a vote of thanks to the author of the paper for his excellent communication.

The vote of thanks having been passed, Mr. SALMON thanked the meeting for the manner in which the imperfect sketch he had placed before them had been received. No one was more sensible than he was of his need of their forbearance. The object of his paper had been so ably pointed out by the Chairman and Mr. Warrington Smyth, that there was no necessity for him to occupy their time further on the same subject.

The Secretary announced that on Wednesday evening next, the 26th inst., a Paper by Mr. David Urquhart, "On the Art of Constructing Turkish Baths, and their Economy as a Means of Cleanliness," would be read. On this evening the Chair will be taken by his Grace the Duke of Wellington, K.G.

INTERNATIONAL PHILANTHROPIC CONGRESS. (CONGRES INTERNATIONAL DE BIENFAISANCE.)—SESSION OF 1862.

The International Philanthropic Congress has for its object the rational and progressive improvement of the physical, intellectual, and moral condition of the working classes and of the poor. It collects accurate information concerning their present state, and the successful or unsuccessful means employed for bettering it; it elicits the opinions of men who have devoted themselves practically to the welfare of their fellow-creatures, and thus gathers together the results of the experience of all nations, for the common benefit of all. It disavows all political or sectarian spirit; adopting philanthropy as a neutral ground where all parties and persuasions may work harmoniously.

The Council of the National Association for the Promotion of Social Science, in a special meeting held on the 22nd of November, 1861, unanimously adopted a resolution proposed by Henry Roberts, Esq., F.S.A., one of the Vice-Presidents at the Session of the Congress held at Frankfort in 1857, inviting that body to hold its next session in London, in conjunction with the Sixth Annual Meeting of the National Association.

A general committee has been appointed for carrying into effect the foregoing resolution. Among the influential persons whose names it includes, or who have promised their support, are the following:—The Duke of Marlborough, the Earl of Shaftesbury, the Earl Fortescue, the Earl of Ducie, Lord Brougham and Vaux, Lord Ebury, Lord Raynham, Lord Kinsale, the Right Hon. W. Cowper, M.P.; the Hon. Arthur Kinnaid, M.P.; Sir Stafford Northcote, Bart., C.B., M.P.; the Lord Mayor; Sir Thos. Phillips, F.G.S.; Sir Joseph Olliffe, M.D.; Samuel Gurney, Esq., M.P.; Edwin Chadwick, Esq., C.B.; Harry Chester, Esq.; Thomas Winkworth, Esq.; George Godwin, Esq., F.R.S.; Alexander Thomson, Esq., of Ban-chory; and John Sutherland, Esq., M.D., F.R.S.

A committee of organisation has made the following arrangements in concert with the Executive Committee of the National Association:—

The use of Burlington-house having been granted for the London meeting of the National Association and the Congress, an office has been established at 12, Old Bond-street, where the members of the Congress will enter their names on arriving in London.

On payment of one guinea, they will receive a ticket admitting them to all the meetings of the Association and Congress, and to all the advantages open to members of the Association during the London session.

As the expenditure required for ensuring the success of the joint meeting of the National Association and Congress will far exceed any sum likely to be derived from the issue of tickets, donation lists will be opened, to which the members of the Association and Congress may subscribe.

The Session will be inaugurated on the 4th of June. Six days will probably be devoted to business. Arrangements will be made for visits to the Great Exhibition and other objects of special interest in or near the metropolis.

It is proposed to direct the special attention of the members of the Congress to those articles in the various departments of the Exhibition which may be most deserving of notice in a sanitary and benevolent point of view. It will be the province of the Congress to consider the expediency of recommending that the articles and inventions thus noted, be collected together at the close of the Great Exhibition, for constituting a special Exhibition of Domestic and Sanitary Economy.

Care will be taken to give to the deliberations of the Congress a character of practical utility, and to afford to every member an opportunity of fully expressing the results of his experience. At the same time, it is essential that in an international assembly, comprising persons whose views on ecclesiastical as well as on political questions greatly differ, such discussions as might wound the feelings of any of its members should be avoided.

Written communications should be in French or English. In oral communications, German or Italian may also be used by special permission.

At the close of the session, the Committee of organisation will be replaced by a special Committee for the publication of the Transactions, of which a copy will be placed at the disposal of each of the members. The Transactions of the National Association will be added on payment of 5s.

Before separating, the Congress will advise as to the best means of giving active development to the system of International Correspondence recommended at the Frankfort Session in 1857, and of thereby maintaining to the Congress a continuous existence, and insuring greater regularity in the convocation of its successive sessions.

The Programme of the Congress, which has lately appeared in French, and from which the foregoing information is derived, proceeds to explain the nature of the communications to be addressed to the Congress, giving at considerable length a classified enumeration of the subjects recommended to the attention of persons interested in promoting the improvement of the moral, intellectual, and physical condition of the people.

It may be mentioned as a proof of the interest taken on the Continent in the Philanthropic Congress, that 1,000 copies have been requested for France, and 200 for Belgium. Active co-operation is expected also from Germany, Switzerland, and Italy.

The Programme may be obtained, on application, at the office, 12, Old Bond-street, or to the Secretary of the Society of Arts.

THE ALPACA IN AUSTRALIA.

The Acclimatisation Society of Victoria have republished in the form of a pamphlet Mr. George Ledger's paper, read before the Society of Arts last session, and in the introduction to it they say:—

"All accounts, to the most recent, are in the highest degree favourable to the project of establishing this animal in Australia. The flock introduced into New South Wales has increased from 283 in 1859, to 417 in 1861. The small herd in the Melbourne Gardens has increased from 19 in 1859, to 45 in 1861, and in either flock casualties are almost unknown. The most favourable accounts have also been received of ten introduced, in 1859, into Queensland, and referred to in this pamphlet. 'No deaths had occurred, and the increase exceeded the most sanguine expectations.'

"In a recent communication, Mr. Charles Ledger states that, having several months since depastured a portion of his animals on lucerne, a portion on clover, and a portion on the natural grasses—that fed on the indigenous pasture was unquestionably in the highest and healthiest condition. One of those lately slaughtered for the Great Exhibition contained 22 lbs. of inside fat.

"Mr. Ledger also states that the superior pasture, and more scientific tending of the alpaca in Australia, produce a finer, larger, stronger, and in every way superior animal to any ever produced in South America; that the staple of wool is excellent, owing to the non-existence of such extraordinary transitions of climate as the animal is subject to in South America—three months of abundant grass, and nine of mere scanty pickings. One fleece sheared in Sydney, of twenty-one months' growth, weighed 26 lbs.

"The great adaptability of the alpaca to Australia is remarked upon, owing to its being a browsing animal as well as a grazing one. It feeds eagerly on shrubs and trees, and, if deprived altogether of grass, would subsist easily upon the coarser plants constituting our ordinary 'scrubs.'

"The flesh was recently experimented upon in Sydney, and favourable reports were made by the several hundreds who tasted it.

"To the successful acclimatisation among us of this animal and its congeners, the llama and vicuna, the Society look therefore with the greatest interest. It is impossible to say of what value it may become in after years, not certainly as superseding the sheep or any other stock now depasturing amongst us, but rather as feeding over the sheep's head, eating herbage that nothing else will eat, and from its little use of water being adapted to occupy millions of acres unfit for any other purpose.

"Indeed, it is of the utmost importance to recollect that it is quite possible that it may devolve upon Australia to develop this animal to a degree never yet imagined. It has been hitherto virtually monopolised by the South American Indian, one of the most unimproving of all the races of mankind, the most beset by traditionary prejudices and ridiculous superstitions, calculated in every way to cramp the intellect and prevent improvements. It remains to be shown what may be done with animals like these, now to be subjected for the first time to the same treatment that has effected such wonders with the Leicester, Lincoln, or South Down sheep, the short-horn ox, the thorough-bred horse, and other domestic animals long since brought under our control."

SOUTH STAFFORDSHIRE UNION OF EDUCATIONAL INSTITUTIONS.

A few months ago the second annual meeting of the above Society was reported in the *Society of Arts Journal*, but the account was rather gloomy than encouraging. Since that time, however, many important alterations have been made, and additional help has been obtained, so that those forebodings of ephemeral existence have, happily, been supplanted by others of a more healthy character.

This society, which has now been in existence about two years, will in future bear the name of an "Association for the promotion of adult education and evening schools." The means by which the Society endeavours to accomplish the objects defined by its title are, the establishment,

examination, and encouragement of classes for special instruction in the subjects prescribed annually by the Society of Arts; and the advancement by similar measures of the more general principles of education contemplated by evening schools and classes. The district within the limits of the association may be defined by the various towns, villages, and parishes within, or bordering on, the South Staffordshire coal field. All institutions intended for the education of adults within such limits, may be in union with the Association by the payment of half-a-guinea per annum, and evening schools by paying five shillings. Each institute in union nominates one of its members as representative, who is an honorary member of the society, and eligible for appointment to any of its offices. The Association consists of a president, treasurer, organizing agent, and hon. secretary; of representatives of institutions in union; of gentlemen who deliver at least two lectures a year on the terms prescribed by the committee; of the government inspectors of mines, schools, and factories within the district; of subscribers of at least half-a-guinea annually; and of donors of money, prizes, or other property to the value of five guineas in one sum. The affairs of that institution are managed by an executive committee, who are elected annually, and meet at intervals of about a month, alternately at Wolverhampton and Dudley. The committee appoint annually a local board to conduct the examinations in the principal towns of the locality. Visitors are also chosen to inspect any night school or institute where the managers are willing to receive them. An annual meeting is held in September, at some important place in the district, when the report is read, all prizes and certificates awarded to candidates distributed, and all other necessary business transacted.

The primary object of the association is the encouragement of evening classes, but it also offers many general advantages to Institutions in union. It provides lectures on reasonable terms; it promotes an interchange of privileges between the various Institutions, by arranging that the tickets of any society in union are accepted as free passes by other societies not in the same town; it secures a means of communication between Institutions, night schools, &c., by the employment of a regular agent, who is at all times ready to give advice and assistance in the management of such Institutions, both in their ordinary departments and special arrangements; it publishes an annual report, embracing the principal features furnished by each Institution during the year, and containing many suggestions and remarks calculated to assist educational movements. The organising agent visits regularly a limited number of Institutions, to organise their classes, and to promote the successful working of the same; attends public meetings to explain the operations of the society; assists in the establishment of new Institutions; holds private preparatory examinations of candidates, and local meetings for conference with night school teachers; and is, in general terms, the representative of the Association throughout the district.

The number of Institutions now connected with the Association is thirty-three, but an equal number still hold aloof for various reasons. But though the Association is treading on firmer ground, it is not yet out of difficulty. It wants a circulating library, diagrams for lectures, and more funds, so that it may be some years before it is able to develop all its plans. Still the managers are hopeful for the future now, and confident that when the next meeting takes place it will be seen that they have been labouring with success.

Home Correspondence.

USE OF APPLES IN DYEING.

SIR,—There has been an opinion prevalent, especially in the West of England, that apples have been extensively used in the application of some of the new and brilliant

dyes mentioned by Dr. Crace Calvert in his paper; and I have found many well informed men in the City, as well as the majority of the members of the Society of Arts to whom I have mentioned the subject, fully believe it. You will, perhaps, not think it out of place, in connection with the interesting paper read last night, to allow the *Journal* to be the medium of giving the assertion a distinct denial. Dr. Calvert has allowed me to use his name in stating that it is a complete hoax; but, to show the utility of giving publicity to this statement, he told me the rumour has obtained such general currency, that he has been called on in Manchester by persons who have been thus misled, and have involved themselves in some expense to supply the market with malic acid from some cheaper source, as, of course, may be easily done; but they have found, to their disappointment, that there is no market for the article. I am, &c.,

W. SYMONS.

17, St. Mark's-crescent, Regent's-park, February 6th, 1862.

LANCASHIRE AND INDIA.

SIR,—Some two years back I expressed in your *Journal* my conviction that, sooner or later, a very large portion of the cotton manufactures would leave Lancashire and return to that India whence they originally sprang. I was taken to task for it by a Manchester man, who desired to be informed when that exodus would take place.

Manchester now complains that the 10 per cent. duty put on by Mr. Laing will operate as a premium to foster Indian manufacturers in cotton, and that mills and machinery are there sprung up. Probably they are clear-headed Manchester men who have set them up.

If the 10 per cent. duty is to ruin the Lancashire trade, what will be the result of the 800 per cent. cheaper wages for mill-hands—3d. compared with 2s.? Will any European or American country be able to compete with India till such time as demand shall have raised Indian labour to a level with European—after Europeans shall have engrafted mills and machinery upon indigenous aptitude.

Are we to regret this—that another portion of the Empire of Great Britain shall enable us to outstrip in cotton the manufactures of the whole world—that the manufacturer leaves a portion of our empire, where it is exotic, to become firmly established where it is indigenous? We may and must regret the misery resulting from a change, even when the change is inevitable, even as we sorrowed over the painful misery of our hand-loom weavers, but we cannot alter the course of nature. The revolution in the American cotton supply is but a prelude to a greater revolution here. London will probably become the emporium—the great European storehouse, for the distribution of Indian bales of manufactured cotton over the whole Continent, and Manchester will replace the deficit of cotton by a surplus of iron. While India was a dependency, and not even a colony, the laws of nature might be inoperative, but as a part of the empire, with disabilities removed, if it will pay to produce cotton, *a fortiori* it will pay to spin and weave it by indigenous labour, and thus, so far as India itself is concerned, save two freights as well as seven parts in eight of the labour cost. The most profitable business for the whole community is, when every man, or class of men, and material, is employed according to natural aptitude.

We do not compete in the production of wine with Spain, or Italy, or Portugal, though we grow in hot-houses the finest grapes in the world; and assuredly we shall not compete with India for cotton fabrics, when machinery is at par and labour eight times dearer in England.

I am, &c., W. BRIDGES ADAMS.

MEETINGS FOR THE ENSUING WEEK.

Mon.....Roy. Geographical, 8½. 1. The Hon. H. P. Vereker, H.B.M. Consul at Rio Grande do Sul, "Report on the Brazilian Province of the Parana." 2. Mr. G. R. Perry, H.M. Vice-Consul for that State, "The Republic of Nicaragua." 3. Capt. Bedford Pim, R.N., "Proposed Transit route through Central America, by way of Nicaragua."

Actuaries, 7.

Medical, 8½. Mr. Henry Thompson, F.R.C.S. Lettsomian Lectures.—3. "Lithotripsy:—Its practical application. Appreciation of all the mechanical methods for the removal of stone from the male bladder."

Civil Engineers, 8. Renewed discussion upon Mr. Joseph D'A. Samuda's paper, "On Iron-Plated Ships."

Royal Inst., 3. Mr. John Marshall, "On the Physiology of the Senses."

WED. .. Society of Arts, 8. Mr. David Urquhart, "On the Art of Constructing Turkish Baths, and their economy as a means of cleanliness."

Geological, 8.

Royal Soc. Literature, 4½.

Archæological Association, 8½.

THURS...Royal, 8½.

Antiquaries, 8½.

Philological, 8.

Philosophical Club, 6.

Royal Inst., 3. Professor Tyndall, "On Heat."

FRI.Royal Inst., 8. Mr. A. E. Durham, "On Sleeping and Dreaming."

SAT.Royal Inst., 3. Mr. Henry F. Chorley, "On National Music."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, February 14th, 1862.]

Dated 8th October, 1861.

2512. I. Evans, jun., Cefn Mawr, Ruabon, Denbighshire—An improved miners' lamp.

Dated 7th November, 1861.

2797. T. Schwartz, New York—Imp. in the construction of air engines or air motors.

Dated 9th November, 1861.

2811. D. Cowan, Hungerford-street, Strand—Imp. in the construction of pneumatic subaqueous tubes for passenger and goods traffic, and in machinery for the manufacture thereof.

Dated 21st November, 1861.

2923. J. H. Jeffs, Tottenham-court-road—Imp. in the manufacture of collars, shirt-fronts, cuffs, hats, bonnets, vests, and other articles of wearing apparel.

Dated 2nd December, 1861.

3023. W. P. Bain, Blackwall—Imp. in protecting ships' bottoms from fouling.

Dated 9th December, 1861.

3079. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Improved natatory apparatus. (A com.)

3080. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—A new or improved combination of microscopic photographs and lenses with certain precious stones or imitations thereof. (A com.)

Dated 21st December, 1861.

3205. T. Morris and R. Weare, Birmingham, and E. H. C. Monckton, Fineshade, Northamptonshire—Imp. in submarine and other telegraphic communication, and in apparatus connected therewith.

Dated 31st December, 1861.

3273. J. B. Cretal, Saint Malo, France—A new process of colouring smoking pipes.

Dated 6th January, 1862.

39. A. V. Newton, 66, Chancery-lane—An improved manufacture of cigars. (A com.)

Dated 8th January, 1862.

58. H. Cook, Manchester—An improved mode of, and apparatus for, transmitting despatches and small articles by the agency of electricity. (A com.)

Dated 9th January, 1862.

66. J. H. Tatum and W. J. Williams, Arundel-street, Strand—Imp. in the manufacture and structure of wicks, and in the application of the same to the manufacture of candles.

Dated 10th January, 1862.

78. L. Petre and E. S. Tucker, 194, Waterloo-road—The application of velvet, plush, cloth, leather, American cloth, oil cloth, and other such like substances, alone and in combination with other materials, for advertising show boards, show cards, window tickets, and all such uses.

Dated 11th January, 1862.

81. T. Ramsay, Newcastle-upon-Tyne—Imp. in the manufacture of coke.

Dated 14th January, 1862.

108. T. Harrison, Birmingham, and J. G. Harrison, Kirby Ravensworth—Imp. in ploughs.

Dated 15th January, 1862.

113. W. Cleland, 39, St. George's-hill, Everton, Liverpool—Imp. in treating and utilising certain materials used and products obtained in the manufacture of gas, and in apparatus connected with the said treatment.

Dated 17th January, 1862.

123. T. Myers, 41, Bloomsbury-square, and E. Myers, 56, Millbank-street, Westminster—An improved composition for preventing rust on bright steel, iron, brass, or metal surfaces.

124. R. Dunlop, Cwm, Avon, Taibach, Glamorganshire—Improved means for facilitating calculations.

Dated 20th January, 1862.

141. L. Barbat, 4, South-street, Finsbury—A new and improved fabric applicable to the manufacture of hats, bonnets, and other like articles.

Dated 23rd January, 1862.

169. J. Hinks and A. Dixon, Birmingham—A new apparatus for warming and drying boots, shoes, or slippers, which apparatus is also applicable for racking or storing boots, shoes, or slippers, for exhibition or otherwise.

170. J. A. Mays, 30, Regent-square—Imp. in envelopes and other wrappers.

175. H. Owen, Albert-terrace, Islington—Imp. in the manufacture of stockings and other articles of hosiery.

Dated 27th January, 1862.

205. J. Lillie, Duke-street, Adelphi—Imp. in the method of protecting ships' bottoms from fouling, and in materials to be used therefor.

Dated 28th January, 1862.

214. H. H. Treppass, 14, St. George's-terrace, Barnsbury-park—Imp. in the construction, use, and employment of the kaleidoscope.

226. W. E. Newton, 66, Chancery-lane—Imp. in engines to be employed by pumping or forcing air or water, and for other purposes where a rectilinear motion is required. (A com.)

Dated 29th January, 1862.

231. F. D. de Boutteville, jun., Fontaine-le-Bourg, France—Imp. in machinery applicable to the spinning of fibrous substances.

234. T. Meriton, 3, Leadenhall-street—Imp. in marine and other boilers for generating steam.

239. W. E. Newton, 66, Chancery-lane—Imp. in printing machinery. (A com.)

241. G. Bedson, Manchester—Imp. in wire fences.

Dated 30th January, 1862.

243. G. Phillips, sen., and G. Phillips, jun., 89, Holborn-hill—Imp. in the distillation and rectification of alcohols or spirits.

244. M. Allen, 14, Worship-street—Imp. in the construction of buildings for the prevention of fire, and in the materials to be employed therein and therefor.

245. T. Gontard, 16, Rue des Vieux Augustins, Paris—Improved truss plates producing an upward pressure.

[247. J. Firth, Heckmondwike, near Leeds—An imp. in finishing mohair cloth.

Dated 31st January, 1862.

253. D. Littlehales, Brearley-street West, Birmingham—An improved plastic compound as a substitute for papier maché.

255. J. Silvester, West Bromwich—Imp. in pocket and other spring balances.

256. F. Baggett, Birmingham, and J. Sanger, Aston, near Birmingham—An imp. or imps. in breech-loading small arms.

258. J. Dodge, Little Portland-street—Imp. in C springs for carriages when used without a perch.

259. W. Walton, Manchester, and F. Walton, Chiswick—Imp. in the manufacture of wire cards.

260. G. Mehrens, 27½, Charles-street, Hampstead-road—Imp. in ladies' stays, and in the bodies of ladies' dresses.

261. J. Hargreaves, 12, Clifton-cottages, Clifton-road, Peckham—Imp. in the manufacture of pipes or tubes for conveying water, gas, acids, sewage, enclosing electric telegraph wires, and for other purposes, which imps. are also applicable to the manufacture of other vessels and articles, and in the machinery or apparatus connected therewith.

263. C. Pontifex, jun., 55, Shoe-lane—Imp. in apparatus for cooling or heating fluids or liquids.

267. A. Forsyth, Glasgow—Imp. in the manufacture of frames and in tablets used for advertising purposes.

268. C. Veronique, Rue Thaitbout, France—An improved wrapper garment.

Dated 1st February, 1862.

270. L. Fauvel, Paris—Imp. in apparatus for indicating the existence of escapes in gas tubing, and for stopping the continuance thereof.

271. R. Burkhardt and C. Doebler, Manchester—Imp. in æolian harps.

275. F. W. Dachne, Swansea—Imp. in furnaces used in the manufacture of zinc.

276. T. Cook, Coburg-road, Old Kent-road—Imp. in machinery for punching, cutting, and pressing metals and other materials.

277. J. Harris, Store-street, Tottenham Court-road—Imp. in mattresses, squabs, pillows, and other like articles of furniture.

278. T. Cook, Coburg-road, Old Kent-road—Imp. in machinery for folding envelopes.

280. P. Riesbeck and W. Becker, Aldermanbury—Imp. in locks or fastenings for bags, portemonnaies, and other like articles having metal frames.

Dated 3rd February, 1862.

282. L. Hill, Port Glasgow—Imp. in applying armour plating to war ships.

284. C. W. Lancaster, New Bond-street—Imp. in strengthening cast-iron ordnance.

286. J. J. King, Chase-lodge, Lavender-hill, Wandsworth-road—Imp. in the fastenings of bedsteads, which fastenings are also applicable to other portable framework.

287. W. E. Newton, 66, Chancery-lane—Imp. in machinery for spinning. (A com.)

Dated 4th February, 1862.

290. G. Manwaring, Southampton—Imp. in flushing apparatus for closets, sewers, and other water services.

293. J. L. Norton, 38, Belle Sauvage-yard, Ludgate-hill—Imp. in beating, stretching, and drying fabrics, and in the apparatus employed therein, part of which apparatus is also applicable for thrashing linseed. (Partly a com.)

295. J. Greenwood, Portland Mills, Bradford—Imp. in means or apparatus for preparing and combing wool and other fibres.

297. J. Webster, Birmingham—Imp. in gas fittings.

Dated 5th February, 1862.

299. D. Gallafent, 15, Stepney Causeway—Certain imp. in the mode or modes of generating or producing elastic vapours to be used as a motive power.

300. W. E. Taylor, Enfield, near Accrington—Certain imp. in carding engines.

301. J. King, Chadshunt, Warwickshire—Imp. in lubricators for lubricating the moving parts of machinery.

302. E. F. Smith and T. Swinnerton, Dudley—Imp. in the manufacture of coke, and in kilns or ovens for the manufacture of coke.

303. J. Browning, Minories—Imp. in aneroid barometers.

304. H. Ashworth, Littleborough, Lancashire—Certain imp. in machinery or apparatus employed in spinning cotton and other fibrous substances.

305. E. Harrison, Oldham—A certain compound or certain compounds to be used as a substitute for gunpowder.

307. J. Lee, Church-gate, Leicester—Imp. in traction engines.

308. J. B. Payne, Chard, Somersetshire—Imp. in the treatment or preparation of hemp, flax, and other analogous fibrous substances for spinning.

309. A. V. Newton, 66, Chancery-lane—An imp. in fire-arms. (A com.)

INVENTION WITH COMPLETE SPECIFICATION FILED.

357. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in smoothing irons. (A com.)—11th February, 1862.

PATENTS SEALED.

[From Gazette, February 14th, 1862.]

February 14th.

2053. W. H. Smith.

2060. W. Firth.

2081. T. Pedrick.

2064. A. S. Rostaing.

2066. H. Esmes.

2069. S. Whitaker and R. A. Jones.

2092. T. Grahame.

2107. A. B. Childs.

2132. E. Feltier.

2162. J. S. Matthews.

2169. W. Hensman and W. Hensman.

2201. W. E. Newton.

2261. J. Bowns.

2267. M. A. F. Mennons.

2453. A. Wreley.

2607. J. Webster.

2665. J. McCall and B. G. Sloper.

2725. W. Cook and H. Cook.

2900. G. Parry.

3031. G. T. Bousfield.

3124. W. Bell.

[From Gazette, February 18th, 1862.]

February 18th.

2057. E. S. Cathels.

2067. R. A. Brooman.

2071. J. Somerville.

2075. F. Gye.

2086. N. Salamon.

2089. J. M. Murat.

2096. J. H. Johnson.

2100. L. M. Casella.

2108. S. Elson.

2114. M. Hyams.

2120. R. W. Jones.

2159. A. Jaille.

2168. W. Clark.

2185. W. Clark.

2223. M. A. F. Mennons.

2224. M. A. F. Mennons.

2234. M. Henry.

2258. L. P. Barré.

2954. G. Lowry.

2961. A. V. Newton.

3005. J. D'Adhemar de Labaume.

2043. W. H. Balmain.

3047. A. T. Carr.

3098. W. E. Newton.

3153. G. Davies.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, February 14th, 1862.]

February 10th.

401. G. Betjemann, G. W. Betjemann, & J. Betjemann.

February 11th.

404. H. Gardner.

412. J. L. Clark.

435. J. J. Russell.

439. J. Breedon.

451. C. Garton.

[From Gazette, February 18th, 1862.]

February 13th.

505. J. H. G. D. Wagner.

February 14th.

408. J. Parkinson.

427. R. Cookson and C. W. Homer.

468. G. Paul.

February 15th.

440. J. Eason.

445. P. E. Fraissinet.

446. T. Cattell.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, February 14th, 1862.]

February 11th.

355. S. B. Wright and H. T. Green.

Journal of the Society of Arts.

FRIDAY FEBRUARY 28, 1862.

INTERNATIONAL EXHIBITION OF
1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £446,500, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

Now that Her Majesty's Commissioners are in possession of the building, the arrangements for the reception and disposal of goods are those which occupy most attention, and the advancement of the building itself, or rather of that portion of it which remains unfinished, is not so much heeded. From the eastern dome all the external scaffolding has been removed, and the huge erection stands out, with its entire outline, in relief against the sky; the glazing of it is not quite completed. Internally, Mr. Crace has commenced the decoration of it, but the forest of scaffold prevents the progress of the work from being observed from below. He has in the meanwhile completed his task in the eastern half of the nave and in the two southern transepts above the gallery line. The ribs of the eastern portion of the nave bear at the tops the names of the different parts of the United Kingdom, and of the colonies and dependencies; those of the south-eastern transept the names of the principal manufacturing towns in England, Ireland, and Scotland.

The western annexe presents at present an appearance of some confusion; the steam-pipes are being laid and the shafting erected for the machinery. The eastern annexe also is backward, as might have been expected from the late date at which it was commenced. There is no doubt that these buildings will be ready very shortly, but in the meanwhile the storing of goods, which are beginning to come into the building, is a matter of some difficulty. Exhibitors, however, are warned that this must not be allowed to form an excuse for delay in the transmission of their goods; everything that is sent Her Majesty's Commissioners will find room for, and the 31st of March is positively fixed as the last day on which goods can be received.

The arrangements for the disposal of the large ornamental objects in the nave are now complete. Just opposite the eastern dais, looking up the nave, is a handsome obelisk, exhibited by the Cheesewring Granite Company, after the design of Mr. John Bell. Then, proceeding westward along the nave, will be found trophies of furniture; of woollen stuffs, from Mr. Titus Salt, and linen fabrics from Belfast; Whitworth and Armstrong guns; two large organs, one by Messrs. Foster and Andrews, of Hull, and one by Messrs. Walker; also trophies of pottery from Messrs. Kerr, of Worcester, and Messrs. Copeland, from the Potteries. Further on are trophies of jewellery and plate from Messrs. Hunt and Roskell, and Messrs. Elkington, and a trophy of furs from Messrs. Nicholay, of Oxford-street. A very beautiful obelisk of grey granite, with ornaments in gold, thirty feet high, and sent by the Ross of Mull Granite Company, will form a striking object near the centre of the building. In the great passage fifty feet wide, which runs transversely across the building from the central entrance, will be other objects distinguished for decoration and superiority of arrangement, the whole interspersed with pieces of sculpture, vases, &c. The south-eastern transept will contain two trophies of steel, one by Messrs. Bessemer, and one by Messrs. Naylor and Vickers, of Sheffield, besides a large collection of ornamental iron-work from the Coalbrookdale Company, and a beautiful screen, manufactured by Mr. Skidmore, of Coventry, and ultimately to be erected in Hereford Cathedral.

The number of fountains is not so great as in 1851. One by Messrs. Minton, in Majolica ware, 36 feet in diameter, will be erected under the western dome, and another from France under the eastern. A small one will probably be placed about Mr. Bell's obelisk, but besides these, Her Majesty's Commissioners have no information that space for others will be required.

It is satisfactory to be able to state that Her Majesty's Commissioners have taken the requisite measures for concentrating all authority and responsibility in one individual, and have appointed Mr. Sandford as sole manager and secretary.

COMMUNICATION BETWEEN THE
DISTRICTS NORTH AND SOUTH OF
HYDE-PARK.

The following Report, made by the Committee of the Society of Arts in December last, was laid before the Right Hon. Wm. Cowper, M.P., First Commissioner of Works. This report was not published pending the consideration of the various plans proposed:—

Considering the connexion of the Society of Arts with the International Exhibition of 1862, and the Society's

interest in the permanent buildings for future exhibitions, the Council are of opinion that it is the duty and interest of the Society to aid in obtaining a provisional road across Hyde-park to the Exhibition buildings during the year 1862, and they have appointed an Executive Committee to carry the object into effect.

The Committee having met, have agreed to the following report:—

1. The Chief Commissioner of Works having announced that the permission of the Crown had been obtained to make a road either across Kensington-gardens or Hyde-park, in order to bring the populous districts north and south into communication with one another, the most important stage in the business has been accomplished, and the Committee feel assured that their proposal will therefore meet with the support of the Commissioner.

2. The cost of making the road, the determination where and of what character the road should be, the settlement of who is to pay for it and how, are subjects which will require much consideration and occupy much time before they can be satisfactorily arranged; and it seems hopeless to expect that the matter can be concluded in all its details so as to enable a road to be made in time for the Exhibition.

3. But there is an urgent necessity for some road during the period of the Exhibition, and the Committee address themselves simply to showing how a feasible temporary measure may be adopted.

4. All the various projects which have been suggested for crossing Hyde Park agree in the importance of not interfering with the ride in Rotten-row. The Committee therefore propose that the existing roads should be used, and a short tunnel should be made immediately under Rotten-row. Any expenditure on this work will therefore be so much in aid of any future road.

5. It is proposed to make use of the existing carriage road from Victoria-gate in the Bayswater-road to the Magazine; to use the present drive over the bridge; to pass through the proposed short tunnel under Rotten-row, and to come out at a temporary gate opposite the Exhibition-road. If it should be necessary, which may be doubtful, to widen the existing road, the cost would not be great, and it could be easily done. The plan adopted with the very crowded traffic at London-bridge, of having policemen to direct certain vehicles in a given direction, would meet all the emergencies in the present case. Public vehicles might be kept to the western side of the road. By a little modification of the railing on the Serpentine-bridge a separate track might be given to the riders. The only disturbance to existing interests would be the temporary introduction of public vehicles over a small portion of the existing drives in the park, and it cannot be doubted that what Her Majesty has been graciously pleased to tolerate for public convenience before Buckingham Palace, would be patiently endured in Hyde-park during the year of the Exhibition.

6. The Committee will enter into communication with the several public bodies from which assistance may reasonably be expected. Considering that the State has made no contribution to the expenses of the Exhibition, which will benefit the Public Revenue, it does not seem to be unreasonable that the Treasury should make a moderate outlay for a purpose which, although of metropolitan and local convenience, has a national bearing. The works here proposed are estimated to cost about £5,500. But if an objection should be raised to provide the whole, then the Treasury might be asked for a portion. Application might also be made to the Metropolitan Board of Works, to the Commissioners for the Exhibition of 1851, and to the Commissioners for the Exhibition of 1862, to the parishes locally interested, and to the public at large, and it would not seem to be a hopeless enterprise to raise the necessary amount.

Dec. 24th, 1861.

Mr. Cowper intends to ask Parliament for a small estimate to make a temporary road, which

will use the existing roads, entering at Victoria-gate, Bayswater, crossing the Serpentine, and coming out at Queen's-gate, Kensington, and so avoiding all tunnels.

The object which the Society's Committee had in view will thus be virtually accomplished, namely, the making a temporary road for the purposes of the Exhibition. What should be done to provide a permanent road will be left for future consideration.

THE ALBERT MEMORIAL.

The general committee of the Memorial Fund met on Friday last, the 21st inst., at the Mansion-house, the Right Hon. WILLIAM CUBITT, Lord Mayor, in the chair.

The LORD MAYOR said that in accordance with a resolution passed at the last meeting, a letter had been forwarded to her Most Gracious Majesty the Queen, to ascertain her feelings in regard to the memorial to the late illustrious Prince, and he had received a reply to that letter through Lieut.-General the Hon. C. Grey. The reply ran as follows:—

“Osborne, Feb. 19, 1862.

“My Lord,—I have had the honour of receiving and of submitting to the Queen your lordship's letter of the 18th instant, communicating the proceedings which have taken place with a view to the erection of a national memorial monument to the much lamented Prince Consort.

“The Queen feels grateful from the bottom of her heart for the universal sympathy which has been expressed for her in her deep affliction. But it is still more soothing to her feelings to know that the noble character—the truly princely nature—of him whose loss has bowed her to the earth with a sense of desolation and misery that every day, alas! serves only to increase—is appreciated by the country; that the benefits he has been instrumental in conferring on the nation—the good he has brought about since he first came amongst us, to effect which he may be truly said alone to have lived—are understood and acknowledged.

“The Queen is also much touched by the feeling which has led the promoters of the movement for erecting a national monument to the Prince to leave the nature of that monument to her decision. It is a subject on which there must be necessarily much difference of opinion. Many, influenced doubtless by the belief that there was nothing which the Prince himself had so deeply and constantly at heart as the promotion of whatever might tend to the advantage of the community at large or any portion of it, have thought that the most appropriate monument to his memory would be to commemorate his name with some great work that should have that end in view, and the Queen cannot but be gratified by this proof of a just appreciation of his character.

“But it would probably be difficult to procure anything like agreement as to the nature of the institution which should thus bear his honoured name, and it would be inexpressibly painful to the Queen were any controversy to arise on such a subject.

“It would be also more in accordance with her own feelings, and she believes with those of the country in general, that the monument should be more directly personal to its object—should be, in fact, more than what is commonly indicated by the word. Even so, it is probable that opinions may differ as to the character that would be most appropriate for such a monument.

“But the Queen is confident that the same good feeling which has led to the reference of the subject for her decision will lead to a cordial acquiescence in it, to the cheerful abandonment of individual views, and to an unanimous working together to effect the object all have at heart.

“After giving the subject her best consideration, her Majesty has come to the conclusion that nothing would be

more appropriate, provided it is on a scale of sufficient grandeur, than an obelisk be to erected in Hyde-park on the site of the Great Exhibition of 1851, or on some spot immediately contiguous to it; nor would any proposal that could be made be more gratifying to the Queen personally, for she can never forget that the Prince himself had highly approved of the idea of a memorial of this character being raised on the same spot in remembrance of the Great Exhibition.

"There would also be this advantage in a monument of this nature, that several of the highest artists of the day might take part in its execution, for there would be room enough at its base for various groups of statuary, each of which might be entrusted to a different artist.

"In the selection of the artists to be employed, in the choice of a design, and in the consideration of the details of execution, the Queen would wish to obtain the best advice, and she would therefore desire to call to her assistance a small committee, consisting of persons in whom she could feel satisfied that the country would repose entire confidence.

"I have written by her Majesty's commands to those whose assistance she thus desires to obtain, and will lose no time, as soon as I have received their answers, in communicating their names to your lordship.

"I have the honour to be,

"Your lordship's very faithful servant,
(Signed) "C. GREY."

Sir EDMUND ANTROBUS, Bart., then moved, "That the Committee desire to express their deep gratification that the measures which they have taken for raising a national monument to the memory of the late illustrious Prince Consort have been honoured by the approval of her Most Gracious Majesty the Queen."

The motion was seconded by Mr. T. BARING, M.P., and carried unanimously.

Mr. GREGSON, M.P., moved, "That a sub-committee be appointed hereafter to co-operate with the Committee to be named by the Queen, in carrying out more fully her Majesty's wishes in the choice of a design, its execution, and the selection of the artist to be employed."

This motion was seconded by Mr. WINKWORTH, and unanimously agreed to.

Mr. Alderman and Colonel WILSON then moved, "That the foregoing resolutions be forwarded to Lieutenant-General the Hon. C. Grey, with a request that they may be laid before her Majesty the Queen."

This motion was seconded by Mr. RUSSELL GURNEX, Q.C., and also carried unanimously.

Accompanying the above letter, a second letter was also received. It is published with her Majesty's permission:—

"Osborne, Feb. 19, 1862.

"My Lord,—The Queen wishes me to add a few words to the answer to your letter, which you will receive with this, expressive in a more especial manner of her Majesty's personal wishes.

"She is aware that she could not with any propriety contribute, as a wife, to a monument to her husband; but she is also the Sovereign of this great empire, and, as such, she cannot but think she may be allowed to join with the nation in the expression of a nation's gratitude to one to whom it owes so much.

"Who has a dearer interest than the Queen in the well-being and the happiness of the people? And if it has pleased God to make her reign so far happy and prosperous, to whom, under Divine Providence, is this so much owing, as to her beloved husband—in all matters of doubt or difficulty her wise counsel, her unfailing guide and support?

"No one can know, as the Queen knows, how his every thought was devoted to the country—how his only aim was to improve the condition of the people, and to promote their best interests. Indeed, his untiring exertions in furtherance of these objects tended, in all probability, to shorten his precious life.

"Surely, then, it will not be out of place that, following

the movement of her people, the Queen should be allowed to consider how she may best take part with them in doing honour to her beloved Prince, so that the proposed monument may be recorded to future ages as reared by the Queen and people of a grateful country to the memory of its benefactor.

"I have the honour to be,

"Your Lordship's most obedient

"and faithful servant,

"C. GREY.

"The Right Hon. the Lord Mayor, &c."

A second meeting took place on Wednesday last, the 26th inst., when the LORD MAYOR read the subjoined letter from General Grey:—

"Buckingham Palace, Feb. 25.

"My Lord,—I have received the Queen's commands to inform your lordship that her Majesty has been pleased to name the Earls of Derby and Clarendon, and Sir Charles Eastlake, to form a committee to advise her Majesty on the subjects referred to in my communication of the 19th instant, and to add that it will give her Majesty much satisfaction if your lordship will also consent to act on that committee.

"I have the honour to be,

"Your most obedient servant,

"C. GREY.

"To the Right Hon. William Cubitt."

The Bishop of London moved a resolution to the effect that the Committee had much satisfaction in acquiescing in her Majesty's wishes.

The resolution was seconded by Mr. Tite, M.P., who remarked that the wish of the Queen was a command, and that he felt assured the small committee her Majesty had been pleased to name would ensure the respect and confidence of the whole country.

The motion was then put and carried with complete unanimity.

The attention of the committee was then called to the propriety of rescinding a resolution passed at their last meeting suggesting the appointment, at a future day, of a sub-committee to co-operate with the committee named by the Queen in carrying out her Majesty's wishes. One of the reasons assigned for abstaining from appointing such a sub-committee was that the necessity for it had been removed by the consideration that three of the four noblemen and gentlemen whom the Queen had called to her assistance were already members of the general committee appointed at the public meeting held in the Egyptian-hall of the Mansion-house.

On the motion of Mr. W. H. Bodkin, seconded by Mr. S. Morley, the resolution in question was accordingly rescinded.

A resolution was also passed on the motion of Mr. Moffatt, M.P., seconded by Sir R. Murchison, authorising the treasurer and trustees to advance from time to time out of the fund raised by the committee such sums of money as may be required by the committee of advice nominated by the Queen to enable them to carry out her Majesty's wishes.

ELEVENTH ORDINARY MEETING.

WEDNESDAY, FEB. 26TH, 1862.

The Eleventh Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 26th inst., His Grace the Duke of Wellington, K.G., in the chair.

The following candidates were proposed for election as members of the Society:—

Brand, James	{ Bedford-hill, Balham, Surrey, S.
Crace, John Dibblee	
	14, Wigmore-street, W.

Crosley, Sir Chas. D	6, Kensington-garden-ter., W.	Trollope, Robt. Leonard .	15, Parliament-street, S.W.
Davis, Samuel	Swerford-park, Enstone, Oxon.	Turner, Archibald.....	63, Aldermanbury, E.C., and
Dean, Albert A.	8, Ludgate-hill, E.C.		Bow Bridge India Rubber
Devas, Thomas	63 and 64, Cannon-st. West,		Works, Leicester.
	E.C., and Mount Ararat,	Veillard, Constant	29, Mark-lane, E.C., and 3.
	Wimbledon, S.W.		Foulis-ter., Brompton, S.W.
Dowling, Thomas	South Sea House, Thread-	Whitmore, Charles S. ...	57, Rutland-gate, S.W.
	needle-street, E.C.	Wier, A. M.	28, Threadneedle-street, E.C.
Eagle, George C.	137, Upper Thames-st., E.C.	Wood, James.....	89, West Smithfield, E.C.
Eaton, Richard	Nottingham.		
Edwards, Samuel	Manor-park, Streatham, S.		
Gay, David.....	74, Cheapside, E.C.		
Harry, Wm. Dyer	19, Gutter-la., Cheapside, E.C.		
Hill, Frederick	Helston, Cornwall.		
Jones, Jas. Patteshall.....	112, Fenchurch-st., E.C., and		
	Roselands, Enfield, N.		
Laird, William	Conservative Club, S.W., and		
	23, Castle-street, Liverpool.		
Leyd, Ernest	2, Finch-lane, E.C.		
Linnington, A. H.	58, Fenchurch-street, E.C.		
Maw, Charles	11, Aldersgate-street, E.C.		
Orde, Sir John Fowlett,	Kilmory-house, Lock Gilp		
Bart.	Head, N.B.		
Palmer, Ebenezer	18, Paternoster-row, E.C.		
	5, Martin's-lane, Cannon-st.,		
Pattison, Henry John ...	E.C., and 18, Boundary-		
	road, St. John's-wd., N.W.		
Phillips, Major-Gen. Sir	Senior United Service Club,		
Travel.....	S.W.		
Sewell, John	26, Nicholas-lane, E.C.		
Skilbeck, John	202, Upper Thames-st., E.C.		
	Salter's-hall, St. Swithin's-		
Thompson, Edward	lane, E.C.		
	91, Great Tower-street, E.C.,		
Westfield, Thomas Clark	and Ashenore-house, Keston.		

The following candidates were balloted for and duly elected members of the Society :—

Ashworth, Edmund	Egerton-hall, near Bolton.
Barber, Charles	36, Fenchurch-street, E.C.
Bonnewell, Wm. Henry..	76, Smithfield, E.C.
Brearey, Plummer T. ...	20, Aldermanbury, E.C.
Brooks, Robert, M.P. ...	St. Peter's-chambers, Corn-
	hill, E.C., and Woodcate-
	park, Epsom.
Browne, Edward	Oak-hill, Surbiton, S.W.
Buckley, Nathaniel	Ashton-under-line.
Bullock, W.	11, Paternoster-row, E.C.
Capper, C.	9, Mincing-lane, E.C.
Cocks, James	25, Cornhill, E.C.
Foster, Wm. Watson ...	157, Fenchurch-street, E.C.,
	and Felling's Works, New-
	castle-on-Tyne.
Gunn, Alex. Hamilton ...	79, Lombard-street, E.C., and
	21, Water-street, Liverpool.
Horsey, Thomas	13, Billiter-square, E.C.
Hyde, John	7, Finsbury-place South, E.C.
Lloyd, Sampson S.	Bank, Birmingham.
Mason, Hugh	Ashton-under-line.
Moore, H. W.	3, Billiter-square, E.C.
Norton, Fletcher C.	1, Albany-terrace, Regent's-
	park, N.W.
Payne, James Jabez	54, Aldermanbury, E.C.
Penny, George	5, Queen-street-place, Upper
	Thames-street, E.C.
Percy, John Thomas ...	26, Great Tower-street, E.C.
Rate, Lachlan M.	21, Upper Grosvenor-st., W.
Ridgway, Rev. Jas., M.A.	29, Oakley-square, N.W.
Roberts, Chas. William..	17, St. Paul's Churchyard, E.C.
Rosenthal, Ludwig ...	14, Mincing-lane, E.C.
Smith, William	9, Mincing-lane, E.C.
Spence, James	77 and 78, St. Paul's Church-
	yard, E.C.
Styles, Thomas	148, Upper Thames-st., E.C.
Sugden, S.	12 and 16, Aldermanbury, E.C.

The Secretary called attention to some drawings said to be the finished designs by Raffael himself for the fresco paintings in the Farnese-palace, and representing Galatea drawn in a car by Tritons ; illustrations of portions of the Fable of the Loves of Cupid and Psyche ; Cupid Pleading before Jupiter in the Assembly of the Gods ; the Marriage of Cupid and Psyche, &c., exhibited by Charles Frederick Jenkins, Esq.

The Paper read was—

ON THE ART OF CONSTRUCTING TURKISH BATHS, AND THEIR ECONOMY AS A MEANS OF CLEANLINESS.

By DAVID URQUHART.

The subject to which I have the privilege of inviting your attention this evening, is neither a construction of art, nor a principle of nature ; it is neither a social institution, nor a pathological operation ; it is neither a domestic convenience, nor a religious observance ; it is neither a means of sobriety, nor an economy of food ; it is neither a psychological adaptation to relieve the overstrained brain, nor a gymnastic device to strengthen the body. It is none of these as exclusive of the others, for it combines them all.

It is a habit of which I have to speak. A habit is only spoken of when unknown : it is, therefore, a habit to be introduced. From this habit, these benefits flow—benefits all already possessed in some degree, the novelty consisting only in degree—a habit which, by rendering us more cleanly, will give us greater strength of muscle, greater power of digestion, greater immunity from disease, greater facilities in recovering health, a longer term of life, a greater contentment in life, more equanimity of mind, a less desire for foreign stimulants, whether physical or mental, which will bring with it a larger share of self-respect, and diminish those causes of disrespect to which we may be exposed from others.

This habit, if new, is no invention. It is no innovation, as being the discovery of some one. It is as old as the human race. It has ruled in all climes ; it has belonged to every grade of human culture, or human destitution. It has prevailed long ago in these very islands, to whose inhabitants it has now to be presented as something claiming their study and deserving their adoption. We must not, however, disguise from ourselves the arduous nature of the enterprise. The introduction of a habit, judged of by human experience, must be far more difficult than the conquest of an empire. Religions may be introduced, constitutions implanted ; but the engraving of the familiar practices of one people on the stock of another, by the rarity of its occurrence in the history of man, must evidently be attended by next to insurmountable difficulties.

We have arrived at a stage peculiarly adapted for calm and fruitful investigation ; the subject is neither strange as new, nor uninteresting as familiar. It is but the first uncertain steps of experiment, that have doubtfully as yet been made. There is enough to show that it may command public adoption, and yet enough to show that it is exposed to public reprobation. We are no longer at the point when, speaking as in the air, it has to be said, such and such is a Turkish bath—the words so uttered

appealing to no sense, touching on no practice, and evoking no chain of familiar incidents. The obstacle and danger proceed from the impressions derived from false experience. Persons go to the so-called baths spread over the country, and, with only rare exceptions, come away thinking they understand, and saying they have been to a Turkish bath. The experiment would have been profitably made only, if they said, "I now know what a Turkish bath is not." At least, it can now be said to them, "It is neither a cellar with a furnace, nor a row of hospital beds. Do not imagine that in entering and passing through rooms strangely fitted up, in London and provincial dwelling-houses, you any more experience the sensation of a Roman or a Turk, than you behold the majestic *Thermæ* of the one people, or the *Hammam* of the other."

Time must be invested in every enterprise which he is destined to consecrate. Time, if put to profit, is experiment, and experiment that is profitable means failure. Failure has ever signalled the strides towards perfection. You have commenced your experiments, they are so excessively encouraging that they have been entire failures. It now depends on the public temperament alone whether this shall pass off as an ephemeral delusion, or remain as an increase of the good things that fortune showers down, and a diminution of the pains and penalties attached to the larger number of our fellow-creatures, too lowly for her smiles to reach.

This nation at this moment presents the spectacle either of a prey furnished to unscrupulous empirics, or of a public judgment adapting itself to admit a great conviction. But it is by the effort to discard the spurious imitation that the public judgment will have disciplined and qualified itself to admit and to accept the new conception.

When on other occasions you have met or may meet in this place, the inducement is the acquisition of knowledge. The order in which the spheres revolve, the processes by which the various arts of life are carried on, how some man has added an additional dose of sand to bricks, or extended the limits of the chamber in which combustion is effected. This evening that to which you will listen concerns yourselves. The knowledge to be acquired is how a man may do for himself in reference to matters concerning him in the most vital manner, and which he has absolutely hitherto committed to others. Each has, therefore, not something to learn in regard to what others have done, but something to acquire as a possession for himself—a possession which, from my own experience, I can state, and in this I am confirmed by many, that if it were to be calculated in money, I would not exchange for any sum that could be set down, if considered as entering into the superfluities of existence.

Nor is it only what a man may do for himself, but, if so minded, the well-being of others becomes a part of his own by his desire to promote it, and here is an opportunity of effecting much at little cost. The effect upon the domestic condition of the working classes, of the habit which prevails among the similar order of the Turkish population, would require, as a parallel in relief, that some ten millions were remitted in the yearly taxes, or an equivalent subscribed by individual charity. I do not mean to say that the benefit to be derived from this habit would be of no more value to them than that number of millions a year, but that, by promoting this habit among the working classes, each may contribute more to the public well-being, and therefore to the public fortune, than any amount of private sacrifice for other objects would effect. The first public address I ever delivered on this subject was in 1847, to a body of working-men in the borough I then represented in Parliament. When I had concluded, a medical man, who was in the chair, said, "You are poor men, and every penny is to you of value. Yet I will tell you, without the slightest hesitation, that had a fifty pound note been put in each of your pockets, the value to you and to your families would not be equal to what you have received to night, if you only have sense enough to put it to profit."

Whilst danger menaces the very inception of the scheme in the West, it is exposed to extinction in the East. Among remarkable things, perhaps there is none more so than the losing of discoveries. We have had in this island of ours, 2,000 years ago, the enjoyment of this benefit and luxury. You are now assembled to learn something in regard to this matter, which has neither been heard of nor dreamt of during these long years. In the meantime, in those lands, where the Romans equally had sway, those happy habits of social and domestic life have been preserved by men destitute of philosophic tendencies. Turkey, which offers to you the bath to-day, will have it no longer in two generations. I myself have seen, in one country, the extinction of it. My first acquaintance with it was in Greece. Greece knows it no longer. That polished Greece—that accumulation of small and fervid existencies—where the imagination of man burnt most brightly, when engaged in its struggle with the Turks, and, under the imitation of the West, dropped their bath. To-day, at Constantinople, the young Turks, imitating Europe, abstain from going to the bath; and the last time I visited that capital the only bath in which I found the old usages maintained was in a small nook of the Dardanelles. What we are doing now in England may prevent its loss in the East. A series of articles in the *Medical Gazette* of Constantinople, wherein, for the first time, type has been used in reference to the bath, has been prompted by what we have been doing in England. If the thing itself be of any value, it is worth having, not only because of its worth, but because otherwise it will be lost to future generations. We have had the ruins of the Romans—we have had the classical literature of our universities; that has not sufficed to convey the thing to us. Dead knowledge will not give you the living thing. You cannot prepare a dinner out of the organic remains of extinct breeds of cattle; no more can you get the habits which belonged to institutions, and the practices which are dependent upon those habits, by mere ink and paper. Even in familiar conversation familiar things find no part; it is the exceptional which alone claims attention. To a far greater degree the rule holds in formal composition. Notwithstanding the habits of literary description among us, a future age would find it impossible to arrive at any exact perception of our mode of carrying through the most ordinary of the occupations of life. How much, then, is the difficulty increased of ascertaining, by written records, what the practices are and were of those nations who have or had the bath, being or having been, all of them, the reverse of loquacious. We are, to this day, unable positively to say, what were the taxes in Rome. It is not, therefore, surprising that we should be absolutely destitute of data as to the origin among them of the bath, and nearly in the same condition as to the original process, and the modifications in successive ages of the operation itself. It is, therefore, utterly impossible that any remains of Rome can enable us to-day to construct the *thermæ* of Rome for the use of our people. And this is the reason why I make it a point that this shall be called the "Turkish bath." That word irritates no doubt our self-love. Each man says, "Am I to be taught by barbarians?" A man better than others is distinguished by the moderation of his self-esteem. But how can you constrain a man, when falsely confident in himself, to adopt a new thing unless you conquer his pride? The Turks have preserved the bath from ancient times; they have also the habits and manners belonging to it; and, therefore, when you say "Turkish bath," you confess that you have to go to the Turks for it.

We have, indeed, the living practice of the Turks, but were the bath to disappear from amongst them, what record would remain to a future age? Scarcely more than a wholly undidactic incident in the Arabian nights. Nor have our travellers, with all the desire to find pictures to transfer to their volumes, served us better. When my attention was first turned to the subject, and I commenced immediately to investigate, I took up successively every

work on the East, and the disappointment which followed set me on noting and recording the operation. With that description I will now begin. I will then proceed to the edifice, so as to connect the operations with the structure. I will then lay before you the steps which, under the influence of trifling incidents, I made towards the investigation of the action of heat, whence has arisen the present application of the bath to the cure of diseases, and then I shall indicate the new field opened in regard to science, both chemically and pathologically, in the distinction between transmitted and radiating calories. The application of the whole will consist in showing that this best method of cleanliness is also the cheapest, and may easily be realised for the whole body of the people, either gratuitously or at a trifling cost.

The bath, when first seen by the Turks, was a practice of their enemies, religious and political; they were themselves the filthiest of mortals; they had even instituted filth by laws and consecrated it by maxims. No sooner did they see the bath than they adopted it; made it a rule of their society, a necessary adjunct to every settlement. Princes and Sultans endowed such institutions for the honour of their reign.

In adopting they purified it from immorality and excess, carrying the art of cleanliness to perfection; they made themselves the most sober-minded of the nations of the earth. This arose from the simplicity of their character and the poverty of their tongue. They had no fallacious term into which to convert it, and no preconceived ideas by which to explain it. Knowing they were dirty, they became clean; having common sense, they did not rush on a new device, or set up either a "water cure," or a joint-stock washing company, but carefully considered and prudently adopted what the experience of former ages presented to their hands.

The operation consists first of the seasoning of the body; second, of the manipulation of the muscles; third, of the peeling of the epidermis; fourth, of the soaping. There are three essential apartments: the great hall, or *mustaby*, open to the outer air; the middle chamber, where the heat is moderate; the inner hall, which is properly the *thermae*. The first scene is acted in the middle chamber; the next three in the inner chamber; and the last in the outer hall. The time occupied is two hours; the operation is repeated once a week.

On raising the curtain over the entrance to the street, you find yourself in a hall, circular, octagonal, or square, covered with a dome open in the centre: it may be one hundred feet in height. The Pantheon of Rome, relic of the baths of Agrippa, may be taken as the type.

"Simple, erect, severe, austere, sublime."

This is the *apodyterium*, *conclave*, or *spoliatorium* of the Romans. In the middle stands a basin, the "sea" of the Jews, the *piscinum* of the Romans; a fountain plays in the centre. Plants are trained over or around the fountain, and by it is placed the stall to supply coffee, pipes, or nargilles. All round there is a platform raised about three feet. You are conducted to an unoccupied couch to undress; your clothes are folded, and deposited in a napkin, and tied up; you are arrayed in the bathing costume, three towels, two yards by one, soft and rough, with broad borders in blue or red of raw silk. This costume has an air of society, not of the laundry or wash-house. One is wrapped with an easy fold round the head, so as to form a high and peculiar turban; the second is bound round the loins; this is the ordinary costume of the attendants, and known in antiquity as *περι ζωα, procinctorium* and *subligaculum*, which have been of difficult interpretation, as implying at once a belt and a clothing. The third is thrown over the shoulder. They are called *peshtimal*; the proper name is *futa*, a word borrowed, as the stuff is, from Morocco. While you change your linen, two attendants hold a cloth before you. The strictest decency is observed, though the apartment is not cut up into boxes. There is nothing which more shocks an Eastern than our want of decorum,

and I have known instances of servants assigning this as a reason for refusing to remain in Europe, or to come to it.

Thus attired, you step down from the platform into wooden pattens (*nal* in Turkish, *cob cob* in Arabic), to keep you off the hot floors, and the dirty water running off by the entrances and passages; two attendants take you, one by each arm above the elbow, walking behind and holding you. The slamming doors are pushed open, and you enter the region of steam.

Each person is preceded by a mattress and a cushion, which are removed the moment he has done with them, that they may not get damp. The apartment he now enters is low and small; very little light is admitted; sometimes, indeed, the day is excluded, and the small flicker of a lamp enables you to perceive indistinctly its form and occupants. The temperature is moderate, the moisture slight, the marble floor on both sides is raised about eighteen inches, the lower and centre part being the passage between the two halls. This is the "cold chamber" of the Turks, the Roman *tepidarium*. Against the wall your mattress and cushion are placed, the rest of the chamber being similarly occupied; the attendants now bring coffee and serve pipes. The object sought in this apartment is a natural and gentle flow of perspiration; to this are adapted the subdued temperature and moisture; for this the clothing is required and the coffee and pipe; and, in addition, a delicate manipulation is undergone, which does not amount to shampooing; the sombre air of the apartment calms the senses, and shuts out the external world.*

During the subsequent part of the operation, you are either too busy or too abstracted for society; the bath is essentially sociable, and this is a portion of it so appropriated—this is the time and place where a stranger makes acquaintance with a town or village. Whilst so engaged, a boy kneels at your feet and chafes them, or behind your cushion, at times touching or tapping you on the neck, arm, or shoulder, in a manner which causes the perspiration to start.

2nd Act.—You now take your turn for entering the inner chamber: there is in this point no respect for persons,† the bathman (the *tellack* of the Turks, the *nekafe* of the Arabs, the *tractator* of the Romans) has passed his hand under your bathing linen, and is satisfied that your skin is in a proper state. He then takes you by the arm as before, your feet are again pushed into the pattens, the slamming door of the inner region is pulled back, and you are ushered into the *adytum*,—a space such as the centre dome of a cathedral, filled—not with dull and heavy steam—but with gauzy and mottled vapour, through which the spectre-like inhabitants appear, by the light of tinted rays, which, from stars of stained glass in the vault, struggle to reach the pavement through the curling mists. The song, the not unfrequent shout, the clapping (not of hands, but sides),‡ the splashing of water and clank of brazen bowls, reveal the humour and occupation of the inmates, who, here divested of all covering save the scarf round the loins, with no distinction between bathers and

* One of the luxuries of the Roman baths consisted in their brightness, the command of the prospect around, and in various strange contrivances. By one of these, the bather, while swimming in warm water, could see the sea; by another, the bathers within were seen magnified without. "They were not content unless they were coloured as well as washed," says Seneca, *Epist.* 87.

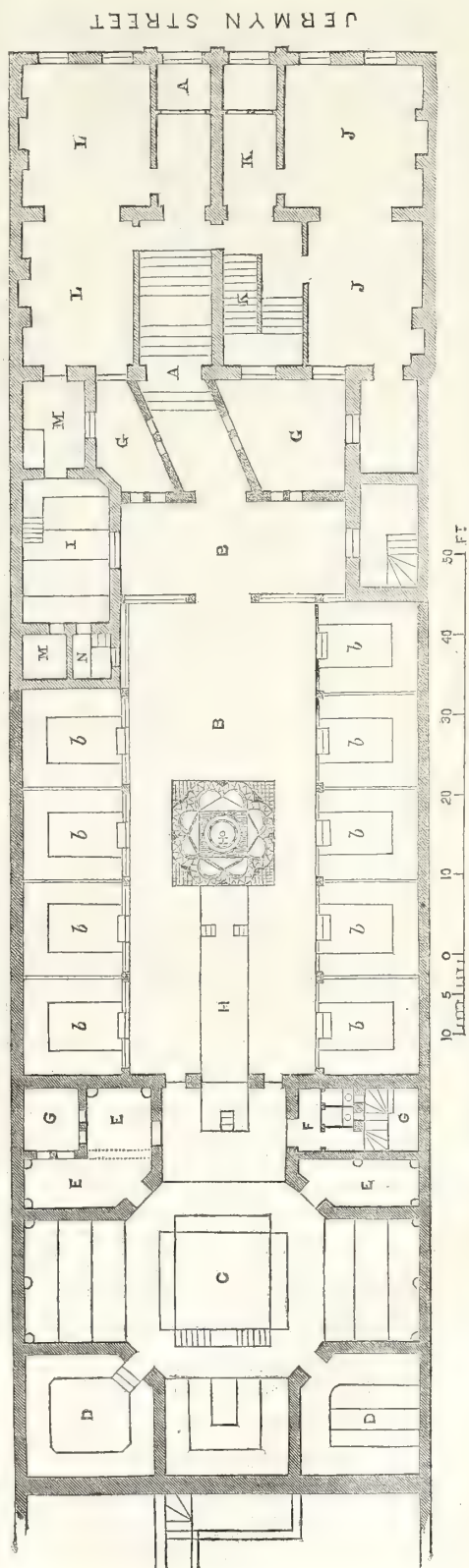
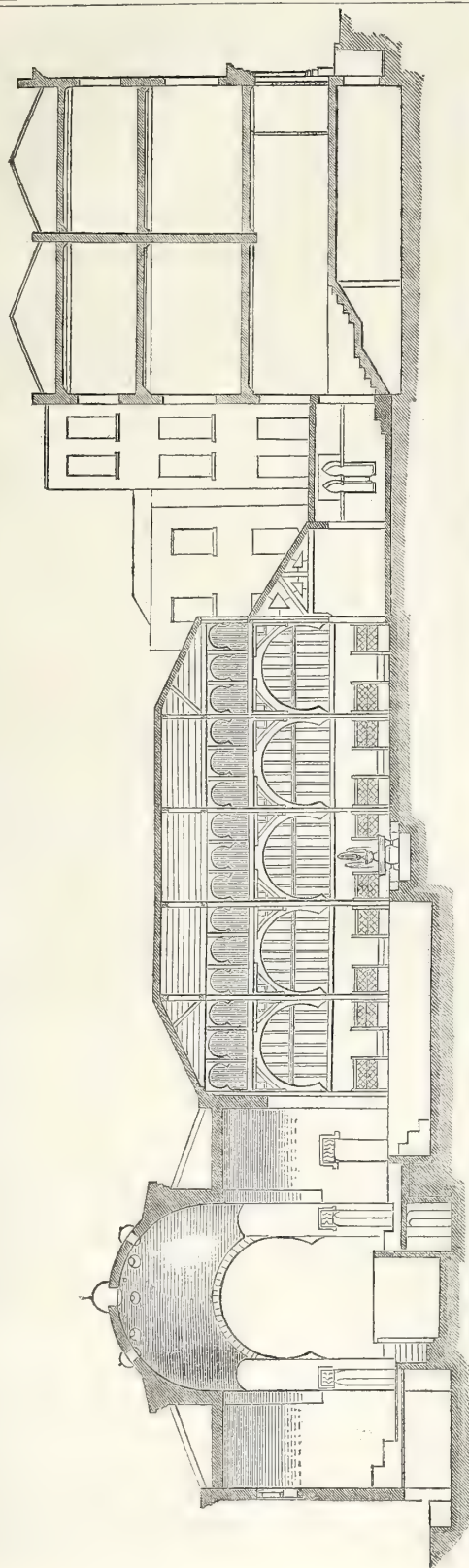
Multus ubique dies radiis ubi culmina totis,
Perforat, atque alio sol improbus uritur astu.—STAT. I. I.

This excess of light in a bath savours of indecency. See Sueton. *Apoll.* lib. ii., epist. 2. It was not the early practice of Rome, nor certainly of those from whom the Romans took the bath. "Our ancestors," says Seneca, "did not believe a bath to be warm unless it was obscure." *Redde Lupi nobis tenebrosa balnea Grilli*,—Mart. i. 60.

† The Roman expression, *quasi locus in balneis*, was equivalent to "first come, first served."

‡ The bathing men give signals for what they want by striking with the hand on the hollow of the side.

THE HAMMAM, OR EASTERN BATH,
DESIGNED FOR THE "LONDON AND PROVINCIAL TURKISH BATH COMPANY." G. SOMERS CLARKE, ARCHITECT.



A, Principal Entrance. B, *Meslek* or Cold. C, Hottest. D, Hot or *Hararah*. E, Washing Room. F, Larders. G G G, Counts. H, Tank and Fountain. I, Private Hot. J, Company's Offices. K, Entrance to Chambers. b b b, *Mustabils* or Divans.

attendants, and with heads as bare as bodies and legs, are seen passing to and fro through the mist, or squatted or stretched out on the slabs, exhibiting the wildest contortions, or bending over one another, and appearing to inflict and to endure torture. A stranger might be in doubt whether he beheld a foundry or Tartarus; whether the Athenian gymnasia were restored, or he had entered some undetected vault of the Inquisition. That is the *sudatorium*. The steam is raised by throwing water on the floor,* and its clearness comes from the high and equal temperature of the air and walls.

Under the dome there is an extensive platform of marble slabs: on this you get up; the clothes are taken from your head and shoulders; one is spread for you to lie on, the other is rolled for your head; you lie down on your back; the *tellack* (two, if the operation is properly performed) kneels at your side, and bending over, grips and presses your chest, arms, and legs, passing from part to part, like a bird shifting its place on a perch. He brings his whole weight on you with a jerk, follows the line of muscle with anatomical thumb,† draws the open hand strongly over the surface, particularly round the shoulder, turning you half up in so doing; stands with his feet on the thighs and on the chest, and slips down the ribs; then up again three times; and lastly, doubling your arms one after the other on the chest, pushes with both hands down, beginning at the elbow, and then, putting an arm under the back and applying his chest to your crossed elbows, rolls on you across till you crack. You are now turned on your face, and, in addition to the operation above described, he works his elbow round the edges of your shoulder-blade, and with the heel plies hard the angle of the neck; he concludes by hauling the body half up by each arm successively, while he stands with one foot on the opposite thigh.‡ You are then raised for a moment to a sitting posture, and a contortion given to the small of the back with the knee, and a jerk to the neck by the two hands holding the temples.

3rd Act.—Round the sides there are cocks for hot and cold water over marble basins, a couple of feet in diameter, where you mix to the temperature you wish. You are now seated on a board on the floor at one of these fountains, with a copper cup§ to throw water over you when wanted. The *tellack* puts on the glove—it is of camel's hair, not the horrid things recently brought forth in England. He stands over you; you bend down to him, and he commences from the nape of the neck in long sweeps down the back till he has started the skin; he coaxes it into rolls, keeping them in and up till within his hand they gather volume and length; he then successively strikes and brushes them away, and they fall right and left as if spilt from a dish of macaroni. The dead matter which will accumulate in a week forms, when dry, a ball of the size of the fist. I once collected it, and had it dried—it is like a ball of chalk: this was the purpose for which the *strigil* was used. In our ignorance we have imagined it to be a horse-scraper to clear off the perspiration, or for other purposes equally absurd.||

4th Act.—Hitherto soap has not touched the skin. By it, however strange it may appear to us,¶ the operation

would be spoiled. The alkali of the soap combining with the oily matter, the epidermis loses the consistency it must have to be detached by rolling. A large wooden bowl is now brought; in it is a lump of soap, with a sort of powder-puff of *liff*,* for lathering. Beginning by the head, the body is copiously soaped and washed twice, and part of the contents of the bowl is left for you to complete the operation yourself. Then approaches an acolyte, with a pile of hot folded *futas* on his head, he holding a dry cloth spread out in front. You rise, having detached the cloth from your waist, and holding it before you; at that moment another attendant dashes on you a bowl of hot water. You drop your wet cloth; the dry one is passed round your waist, another over your shoulders; each arm is seized; you are led to the middle chamber, and seated; the shoulder cloth is taken off, another put on, the first over it; another folded round the head; your feet are already in the wooden pattens. You are wished health: you return the salute, rise, and are conducted by both arms to the outer hall.

The platform round the hall is divided by low balustrades into little compartments, where the couches of repose are arranged, so that while having the uninterrupted view of all around, parties or families may be by themselves. This is the time and place for meals. The bather having reached this apartment is conducted to the edge of the platform, to which there is only one high step. You drop the wooden patten, and on the matting a towel is spread anticipating your foot-fall. The couch is in the form of a letter M† spread out; it takes less space than a chair. As you rest on it the weight is everywhere directly supported—every tendon, every muscle is relaxed; the mattress fitting, as it were, to the skeleton; there is a total inaction, and the body appears to be suspended. The attendants then re-appear, and, gliding like noiseless shadows, stand in a row before you. The coffee is poured out and presented, the pipe follows; or, if so disposed, you may have sherbet or fruit; the sweet or water melons are preferred and they come in piles of lumps large enough for a mouthful; or you may send and get kebobs on a skewer, and if inclined to make a positive meal at the bath, this is the time.

The hall is open to the heavens, but nevertheless a boy with a fan of feathers, or napkin, drives the cool air upon you. The Turks have given up the cold immersion of the Romans, yet so much as this they have retained of it, and which realises the end the Romans had in view to prevent the breaking out of the perspiration; but it is still a practice with the Turks to have cold water thrown upon the feet. The nails of the hands and feet are dexterously pared with a sort of oblique chisel; any callosities that remain on the feet are rubbed down; during this time the linen is twice changed.‡ These operations do

the bodies are cleansed by small bags of camels' hair woven rough, or with a handful of the fine fibres of the Mekka palm-tree combed soft, and filled with fragrant saponaceous earths, which are rubbed on the skin, till the whole body is covered with froth. Similar means were employed in the baths of Greece, and the whole was afterwards cleansed off the skin by gold or silver *strigils*.—"Manners and Customs of Ancient Greece," J. A. St. John, vol. ii. p. 89.

* Nut of the palm, and consequently hard and not fit to use on the person. The Moors, though they do not use soap in the bath, always use their soft *liff* with their soft soap, which practice the Turks have imperfectly followed."

† The *duretum*, introduced by Augustus at Rome. "On trouve alors des lits délicieux; on s'y repose avec volupté, on y éprouve un calme et un bien-être difficiles à exprimer. C'est une sorte de régénération, dont le charme est encore augmenté par des boissons restaurantes, et surtout par un café exquis."—D'Ossun, t. vii. p. 63.

Galen ("Method. Therap." l. x. c. 10.) says, "Let then one of the servants throw over him a towel, and being placed upon a couch, let him be wiped with sponges, and then with soft napkins." How completely this is the Turkish plan, one familiar with the bath only will understand. Explanation would be tedious.

* Let the air of all the rooms be neither particularly hot nor cold, but of a proper temperature, and middling moist; which will be effected by plentifully pouring temperate water from the cistern, so that it may flow through every room.—Galen, "Therap. Meth." l. x.

† Percurrit agili corpus arte tractatrix,
Manumque doctum spargit omnibus membris.

Mart. iii. 82.

‡ "Et summum domine femur exclamare coegit."
Juvenal, Sat. vi. v. 422.

§ These basins are the *pelvæ* of the Romans.

|| The *strigil* was used after bathing, to remove the perspiration. The hollow part was to hold oil to soften the skin, or to allow the scraped grease to run off.—DENNIS, vol. ii. p. 426.

¶ Whenever our writers touch on these matters, they fall into inevitable confusion, e. g.:—"In the baths of the East,

not interrupt the chafing of the soles,* and the gentle patting on the outside of the folds of linen which I have mentioned in the first stage. The body has come forth shining like alabaster, fragrant as the cistus, sleek as satin, and soft as velvet. The touch of the skin is electric. Buffon has a wonderful description of Adam's surprise and delight at the first touch of himself. It is the description of the human sense when the body is brought back to its purity. The body thus renewed, the spirit wanders abroad, and, reviewing its tenement, rejoices to find it clean and tranquil. There is an intoxication or dream that lifts you out of the flesh, and yet a sense of life and consciousness that spreads through every member. Each breathful of air seems to pass, not to the heart, but to the brain, and to quench, not the pulsations of the one, but the fancies of the other. That exaltation which requires the slumber of the senses—that vividness of sense which drowns the visions of the spirit—are simultaneously engaged in calm and unspeakable luxury; you condense the pleasures of many scenes, and enjoy in an hour the existence of years.

But "this too will pass."† The visions fade, the speed of the blood thickens, the breath of the pores is checked, the crispness of the skin returns, the fountains of strength are opened; you seek again the world and its toils; and those who experience these effects and vicissitudes for the first time exclaim, "I feel as if I could leap over the moon." Paying your pence according to the tariff of your deserts, you walk forth a king.

A writer in the "Library of Travel" says:—"Strange as it may appear, the Orientals, both men and women, are passionately fond of indulging in this formidable luxury; and almost every European who has tried it speaks with much satisfaction of the result. When all is done, a soft and luxurious feeling spreads itself over your body; every limb is light and free as air; the marble-like smoothness of the skin is delightful; and after all this pommelling, scrubbing, racking, parboiling, and perspiring, you feel more enjoyment than ever you felt before."

This chief of luxuries is common, in a barbarous land and under a despotism, to every man, woman, and child; to the poorest as to the richest, and to the richest no otherwise than to the poorest.‡ But how is it paid for? How can it be within the reach of the poor? They pay according to their means. What each person gives is put into a common stock; the box is opened once a week, and the distribution of the contents is made according to a scale; the master of the bath comes in for his share just like the rest. A person of distinction will give a pound or more; the common price that, at Constantinople, a tradesman would pay, was from tenpence to a shilling; workmen, from twopence to threepence. In a village near Constantinople, where I spent some months, the charge for

men was a halfpenny,* for women three farthings. A poor person will lay down a few para's to show that he has not more to give, and where the poor man is so treated he will give as much as he can. He will not, like the poor Roman, have access alone, but his cup of coffee, and a portion of the service like the rest.† Such habits are not to be established, though they may be destroyed, by laws.

This I have observed, that wherever the bath is used it is not confined to any class of the community, as if it was felt to be too good a thing to be denied to any.

All these practices vary among the Moors. First, there is no bath linen. They go in naked. Then there is but one room, under which there is an oven, and a pot, open into the bath, is boiling on the fire below. There are no pattens—the floor burning hot—so boards are used. At once the operation of shampooing commences. There is a dish of gazule, for the shampooer to rub his hands in. You are seated on the board, with the legs straight out; the shampooer seats himself on the same board behind you, stretching out his legs. He then makes you close your fingers upon the toes of his feet, by which he gets a purchase, and, rubbing his hands in the gazule, commences upon the middle of the back with a sharp motion up and down, between beating and rubbing, his hands working in opposite directions. After rubbing in this way the back, he pulls the arms through his own and through each other, twisting you about in the most extraordinary manner, and drawing his fingers across the region of the diaphragm, so as to make even a practised bather shriek. After rubbing in this way the skin, and stretching at the same time the joints of the upper body, he places himself at your feet, dealing with the legs in the like manner. Then thrice taking each leg and lifting it up, he places his head under the calf, and raising himself, scrapes the leg with a rough brush, for his shaved head has the grain downwards. The operation concludes by his biting your heel.

A great deal of learning has been expended upon the baths of the ancients, and a melancholy exhibition it is—so much acuteness and research, and so little or rather no profit. The details of these wonderful structures, the evidences of their usefulness, have prompted no prince, no people of Europe to imitate them, and so acquire honour for the one, health for the other. The writers, indeed, present not living practices, but cold and ill-assorted details, as men must do who profess to describe what they themselves do not comprehend. From what I have said, the identity of the Turkish bath with that of the Romans will be at once perceived, and the apparent discrepancies and differences explained. The *apodyterium* is the *mustaby*, or entrance hall; after this comes the sweating apartment, subdivided by the difference of degrees. Then two operations are performed, shampooing, and the clearing off of the epidermis. The Romans had in the *tepidarium* and the *sudatorium* distinct attendants for the two operations, the first shampooer receiving the appropriate name of *tractator*; the others, who used the strigil, which was equivalent to the glove, being called *suppelones*. The appearance of the strigil in no way alters the character of the operation. They used sponges also for rubbing down, like the Moorish gazule. They used no soap; neither do the Moors; the Turks use it after the operation is concluded. The *laconicum* I understood when I saw the Moorish bath, with the pot of water heated from the fire below, boiling up into the bath. I then recollected that

* If you desire to be awakened at a certain hour, you are not lugged by the shoulder or shouted at in the ear; the soles of your feet are chafed, and you wake up gently, and with an agreeable sensation. This luxury is not confined to those who have attendants, few or many; the street-porter is so awakened by his wife, or child, or brother, and he in turn renders the same service. The soles of the feet are exposed to a severity of service which no other muscles have to perform, and they require indulgent treatment, but with us they receive none.

† Motto of the Vizir of Haroun el Raschid, when required by his masters to find one which should apply at once to happiness or adversity.

‡ Volney once entered a Turkish bath, and, in horror and dismay, rushed out, and could never be induced to enter one again. Lord Londonderry was more submissive, and endured its tortures to the end; but rejected the coffee, and pipes, and civilities then proffered. He has given us a detail of his sufferings, which appear to have been notional. Sir G. Wilkinson, in his work on Thebes, cites them at length, and this is all that he deems it requisite to tell the strangers who arrive in Egypt on the subject of the *hamam*.

* The charge at Rome was a quadrans, or farthing; children paid nothing. Nec pueri credunt, nisi qui nondum are lavantur. —Juvenal, "Sat." ii. v. 152. In some baths it would appear that even grown persons were admitted gratis. Balneum, quo usus fuisset, sine mercede exhibuit. —Jul. "Capit."

† A poor man will go to the shambles, and cut off a bit of the meat that is hanging there, and the butcher will take no notice of it. If he goes to have a cup of coffee, and has not five para's (one farthing), he will lay his two or three on the counter, instead of dropping them into the slit; the next customer will lay down ten, and sweep them in together.

there is in the Turkish baths an opening, by which the steam from the boilers can be let in, although not frequently so used, nor equally placed within observation. Many of the Turkish baths have, doubtless, been originally Greek. The change in respect to the use of cold water is compensated for* by the cold air of the outer room, into which the Turks come, and is preserved in the partial use of cold water for the feet. The hot-water reservoirs, the *labrum* and *solium*, are still to be seen in the private baths; they are in those of the Alhambra. When used, the character of running water, an essential point among the Turks, is given to them by a hole being left below, which is unplugged, and a stream kept running in from a cock. It would appear that the Romans followed the same method. The *piscinum* of the Romans is found in the Moorish gardens. In the use of the depilatories, or the shaving off the hair, the practice of the Turks is exactly that of the Romans; the parts of the bath appropriated to that purpose being the same. The *olearea* are alone wanting. The Mussulmans would consider the smearing of the body with oil or ointments not as a part of the bath, but a defilement, for which the purification of the bath was requisite.†

The Romans took the bath daily; the Turks have restricted its use to once a week. The Romans entered the bath naked; the Turks have introduced a bathing costume; the Romans allowed the two sexes to enter promiscuously—the Turks have wholly separated them. Preserving the good, they have purified it from excesses, which, to a people of less discrimination, might have appeared to constitute its essential character, or to be entailed as its necessary consequences. Our studies and learning have furnished us with no such results. These very excesses have been assigned as a reason for the disuse of the bath by the early Christians. If the explanation were true, the difference between the Christians and the Mussulman would amount to this, that the first could see and reject the evil, the second perceive and select the good.

There is one point connected with the bath on which I must say a few words, especially as in this case our usages do not present any obstacle to the adoption of a good habit, and I have repeatedly had the gratification of finding that the suggestions which follow were of use.

Those who wash the rest of their body often, except the head; the practice of smearing it with oil almost universally prevails. The Easterns do the reverse—they shave it. A greater comfort there cannot be than a bald pate. Washing the head is in no case prejudicial. Unless you wash the head, the washing of the body is neither complete nor satisfactory. The refreshment of washing the head may often be procured when it is impossible to wash the body. Soap and water are injurious, not to the hair, but to the hair-dressers. The men of the East have no hair to show, but if soap and water injure the hair, whence comes the luxuriant abundance of that of the women? The hair of the head, like the fur of animals, is made to bear rain and wind, and to be a protection against them. You cover it up. The fur of animals thickens and strengthens when exposed to air and wet. Your hair falls off, and you oil it. If it grows weak, change its habits. If it is not washed, and if it is oiled, begin to wash it, and leave off oiling it.

Every week an Eastern lady has her hair thoroughly washed at the bath. It is first well soaped and

rubbed. They are very particular about soap, and use none but that made of olive oil. The Castile soap, which in this country is sold at the apothecary's, is the soap the least injurious to the skin. This is twice repeated. After the soap, they apply a paste of Armenian bole and rose leaves. This is rubbed into the roots of the hair, and left to imbibe all the grease of the head; it is then, like the soap, washed off with bowls of hot water, and leaves the locks perfectly clean and silken. From time to time they dye it. On these occasions an attendant mixes up a handful of henna-dust in hot water, and thoroughly smears with it the hair, which is then turned up into a ball, and bound tightly with a napkin. In this state they go through the bath. When the napkin is removed, and the henna-paste washed out, the hair, if before black, will have become of a bronze auburn, and if grey, red. The bath occupies from three to four hours, with the smoking, chatting, music, and dancing which accompany it, in an atmosphere which excludes every unpleasant sensation. The women are not, like the men, contented with the bathing linen and apparatus which they find there; but are followed by female slaves, who bear bundles of towels, in silk and satin wrappers, boxwood pattens, incrustated with mother of pearl, silver basins and bowls, or sometimes enamelled ones, and aloe-wood and ambergris to perfume both the apartment and their coffee. This finery is less than what they indulge in in their private baths.

The Romans and Greeks, in like manner, were accompanied by their slaves, and did not trust to the service of the *thermae*. Each person brought his strigil and his anointing vase (*strigilis et ampulla*, *λήκυθος και ξύστρα*)* or sent them by his slave. The practice furnishes the familiar metaphors which express the different conditions.† The strigil was the sign of comfort, and also of sobriety and industry. It was, according to Cicero, necessary to the happiness of the Roman citizen; it had to do with the fortunes of the Roman state. Rome was indebted to her strigil no less than her sword for the conquest of the world.

Mr. Chadwick has, on one point, made some observations which I wish to give with my answer:—"Is not the strigil a substitute for the shampooer, or may it not be referred to as the poor man's substitute; ought it not to be tried? How were shampooers to be got in sufficient number for the crowded baths of the poor? One of the shampooers told me that twelve hours a day exhausted him. At that rate, would not 6d. per person be about the charge for the labour? This would be an obstacle to the very poorest, and I apprehend turn the scale of the warm water bath. Does not the use of the strigil meet such cases?"

My answer is as follows:—"As to your question respecting the strigil, I have to reply that it is the instrument of the shampooer, and cannot be a substitute for him. But the shampooer is not only the professional man, he is also every man. It was after a month that I visited the experimental bath in Jermyn-street, where the patients from the Consumptive Hospital had been taking it, and I found them all dependant upon the regular shampooers. When I expressed my astonishment at such a sight, they on their

* The two instruments were slung together. The *guttus* was round, and from its round flat orifice the oil distilled. *Guttatim tenticulari forma, terite ambitu, pressula rotunditate*.—Apuleius. On coins, vases, and bas-reliefs, it has been mistaken for the pomegranate, for a bulbous root, or a lustral vase. A curious Greek papyrus, in which a reward is offered for a runaway slave, or *Lechythophoros*, has cleared this matter from all ambiguity. Mr. Letronne has restored and translated the papyrus. It is also to be seen in the Lycian tomb, of which a cast is in the British Museum, and one of the groups is given in colours in Fellows's *Lycia*.

† *Ἀντολήκυθος*, signifies a poor man. *Ἐμάντω Βαλανεύσω*, was equivalent to "I am my own butler." Have you dreamt of *Lechyth*, or *Xystra*? that is the sign of a woman that attends to her household (*οὐκουρον*) or of a faithful handmaid.—Artemid., *Oneiroc.* i. 64.

* On entering, they remain in the hot air, after which they immerse themselves in hot water, then they go into cold water, and then wipe off the sweat. Those who do not go from the *sudatory* at once into cold water burst out, on returning to the dressing room, into a second sweat, which at first is immoderate, and then ceases, and leaves them chilly.—Galen, "*Method. Med.*" l. x. c. 2.

† While it is essential to cleanliness to clear away the oily matter that exudes from the skin, the oil afterwards applied to the cleansed body seems to be beneficial, and to keep open instead of closing the pores.

side expressed themselves much delighted with the idea of shampooing one another. It is one of the desirable results to be obtained from this new method, to break down that sense of menial service attached to the assistance that man has to render to man, and which belongs to the coarseness and vulgarity of our manners, and which so pervades us that we read ourselves only in the picture of the most opposite character held up to us by the East to-day, or by antiquity.

"I have more than once quoted the expression *σαντων βαλνυθεις*, or "a man bathing himself," as the designation of the Greek, of all that was wretched, mean, and sordid. But Englishmen, reading the word, and finding it even accompanied with my explanation of it, can only see in it "independence."

"I once went to the bath with Ahmed Pasha, then High Admiral, and the first man in the empire. Six Pashas accompanied us. They performed the service. The Captain Pasha himself insisted on shampooing me, and further took the charge of Chiboukji. You can have no idea of the difference it makes to life, when on the one hand there is dignity and etiquette, and on the other a readiness and a love to perform every service by which one man can render himself agreeable to another. As politeness is of all things that which it is desirable for the people of this country to learn, so of all means does the bath present in its operations the readiest for inculcating it and practising it.

"Therefore you will see that there will be no increase of expense in connection with shampooing. Nor do I think it will be desirable to introduce the strigil, because the rubbing off the skin by means of the glove is a far more efficacious as well as agreeable process, than scraping it off with the strigil."

This constant washing occasions, it may be supposed, an enormous waste of water. A Turk uses less water than an English gentleman. It is true every Turk, high and low, uses the same quantity, and washes in the same manner; but the utensils and conveniences are differently adapted. There are no wash-hand basins and ewers in bedrooms, no foot-pans, hip-baths, shower-baths, &c. They do not dabble in dirty water, defiling a great quantity. They wash under a stream of water running from a fountain, urn, or ewer. A handful serves to moisten the soap and to rub with it, and a couple more rinse it completely off. The fountains are placed in the passages, staircases, &c. By the mosques, and in the streets, they are so arranged that, by sitting on the step you can wash the feet and the head. When you wash in a room, one attendant brings the basin, *laen*, with its pierced cover, and kneels before you; another the ewer, *ibrik*, with its long, narrow neck to pour the water.* In the bath, steam and perspiration cleanse, and two or three large saucerfuls suffice for rinsing;—fifty persons may be bathed with the same water that serves to fill our trough for washing one.

What a difference it makes in domestic comfort to be certain that every person around you, and every thing you touch and eat, are absolutely clean! After this manner of life, the habits of Europe are most painful; you are constantly oppressed with the touch, or sight, or knowledge of things which, by the European, are not considered unclean, or are submitted to as unavoidable. It would but faintly describe my impressions to say, that I felt as if passing from a refined to a rude condition of society. Neither do we know how to cultivate or handle the body. One of the first thoughts was, "What shall I do in sick-

ness?" All Europe's seductions and luxuries put together will not make up for this one.

The European is clean, in so far as he is so, for appearance; he has clothes and shoe-brushes, blacking, starch, smoothing-irons, &c.; in these consists his neatness.* The clean shirt is put upon the dirty body; the hands and face, being alone open to the air and sun and the eyes of the neighbours, are washed. Nothing is filthy that is unseen.† The Eastern has no brush or blacking; no care is expended or expense incurred for neatness. He has his religious ablutions for prayer.‡ He will not tell you that he washes for his comfort or his health, but because it would be a sin not to do so.

Our intercourse with the lower orders is broken off by there being no settled occasion on which we are in contact with them, and by the want of cleanliness in their persons. Here both classes are constantly brought into the presence of each other. Contempt and distaste are removed on one side, degradation and irritation on the other; they know one another; the intercourse of various ranks requires and sustains a style and demeanour which strikes all Europeans, who are astonished that the bearing of the peasant is as courtly as that of the Pasha,—he is as clean as the Pasha. What must Easterns think of us where the difference of condition can be traced in speech, manner, and washing? The bath is of as great value to society as to the individual. A political economist, glorifying his age, exclaims—"Augustus in all his splendour had neither glass for his window nor a shirt to his back." The slave and the beggar in Rome were daily in the enjoyment of luxuries which no European monarch knows.

There is an impression that the bath is weakening. We can test this in three ways; its effects on those debilitated by disease, on those exhausted by fatigue, and on those who are long exposed to it.

1. In affection of the lungs and intermittent fever the bath is used. The effect is to subdue, by a healthy perspiration in a waking state, the unhealthy one in sleep.

2. After long and severe fatigue—fatigue such as we never know—successive days and nights on horseback—the bath affords the most astonishing relief. Having performed long journeys on horseback, even to the extent of ninety-four hours, without taking rest, I know by experience its effects in the extremest cases.

A Tartar, having an hour to rest, prefers a bath to sleep. He enters as if drugged with opium, and leaves it, his senses cleared and his strength restored, as much as if he had slept for several hours. This is not to be attributed to the heat or moisture alone, but to the shampooing, which in such cases is of an extraordinary nature. The Tartar sits down and tumbles himself up; the shampooer (and he selects the most powerful man) then springs with his feet on his shoulders, cracking his vertebrae; with all his force and weight he pummels the whole back, and then turning him on his back and face, aided by a second shampooer, tramples on his body and limbs; the Tartar then lays himself down for half an hour, and perhaps, though it is not necessary, sleeps. Well can I recall the *hamâm* doors which I have entered, scarcely able to drag one limb after the other, and from which I have sprung into my saddle again, elastic as a sinew, and light as a feather.

* *Neat and proper*, are two words which we have changed from their original sense to cleanliness.

† Granting that the English are tolerably clean in the matter of their faces and hands, their houses and clothes, it must be confessed that they do not seem sufficiently impressed with the importance of keeping their whole bodies clean. Suppose the English were the cleanest people in the world, it would be fearful to think, when we know what they are, how dirty the rest of the world must be.—"Family Economist," p. 40.

‡ The *abdest* of the Mussulman consists in washing hands to the elbow, feet, face, and neck, five times a day in cold water without soap. The *vadhan* of the Jew is only three times, and does not extend to the feet. The priests washed feet and hands.

* I find the most convenient substitute, a vase holding about two gallons of water, with a spout like that of a tea-urn, only three times the length, placed on a stand about four feet high, with a tub below; hot or cold water can be used; the water may be very hot, as the stream that flows is small. It runs for a quarter of an hour, or twenty minutes. The Castilian soap should be used in preference to the made-up soaps of England. Of English soaps; the common yellow washing soap is the best. N.B.—A clean sheet on the dressing-room floor, and no slippers.

You will see a *hummal* (porter), a man living only on rice, go out of one of those baths, where he has been pouring with that perspiration which we think must prostrate and weaken, and take up his load of five hundred-weight, placing it unaided on his back.

3. The shampooers spend eight hours daily in the steam; they undergo great labour there, shampooing, perhaps, a dozen persons, and are remarkably healthy. They enter the bath at eight years of age; the duties of the younger portion are light, and chiefly outside in the hall, to which the bathers retire after the bath; still, there they are from that tender age exposed to the steam and heat, so as to have their strength broken, if the bath were debilitating. The best shampooer under whose hands I have ever been, was a man whose age was given to me as ninety, and who, from eight years of age, had been daily eight hours in the bath. This was at the natural baths of Sophia. I might adduce, in like manner, the sugar-bakers in London, who, in a temperature not less than that of a bath, undergo great fatigue, and are also remarkably healthy.

The Romans furnish another example. Unlike the Arabs, who restrict its use to once a week, they went into it daily. The temperature was gradually raised, until, in the time of Nero, it became excessive. Their habits, in other respects, were not such as to be conducive to health, and must have disqualified them for using the bath if it did debilitate; it served, therefore, as an antidote to their manner of life, and relieved the excess of the patrician, as it does to-day the fatigue of the Tartar.

Life is chemical and galvanic, but both these agencies result in, and depend upon, motion; the vessels are constructed for conveying fluids—the muscles for generating power. Thus, shampooing exerts over the human body a power analogous to that of drugs administered by the mouth. A blow which kills, a posture which benumbs, pressure which in long disease becomes a chief obstacle to recovery, exercise which gives health and strength—are all evidences of the influence of motion over our system.

Who has not experienced in headaches and other pains, relief from the most unartful rubbing? You receive a blow, and involuntarily rub the part. Cold will kill; the remedy is brandy and friction. The resources of this process surely deserve to be developed with as much care as that which has been bestowed upon the *Materia Medica*. Where practised, human suffering is relieved, obstructions are removed, indigestion is cured, paralysis and diseases of the spine, &c., arising from the loss of muscular power, are within its reach, while they are not under the control of our medicines. Here is a new method to add to the old. Wherever it can be employed, how much is it to be preferred to nauseating substances taken into the stomach; how much must the common practice of it tend to preserve the vitality of the whole frame! Even if disregarded as an enjoyment of health, it offers a solace which ought to be invaluable in the eye of a medical man, as of course it must be of the patient. We have all to play that part.

Where the practice is familiar, it is used not merely in the bath, but upon all occasions. It is to be found without the bath, as among the Hindoos, some Tartar tribes, the Chinese, and the Sandwich islanders—the latter present one of the most remarkable phenomena. The different ranks are of different stature. The chiefs are sunk in sloth and immorality; and yet it is not they who, like the grandees of Spain, are the diminutive and decrepid race—they are shampooed.* A practice which our epicures and

* The chiefs of either sex are, with very few exceptions, remarkably tall and corpulent. For this striking peculiarity various reasons may be suggested. * * * But in addition to any or all of these possibilities, one thing is certain—that the easy luxurious life of a chief has had very considerable influence in the matter; he or she, as the case may be, fares sumptuously every day, or rather every hour, and takes little or no exercise, while the constant habit of being shampooed after every regular meal, and oftener, if desired or expedient,

our stoics, our patients and our doctors, would alike despise—counteracts the consequences of gluttony, intoxication, debauchery, and sloth, and supplies the place of exercise and temperance; and a people which can boast no school of philosophy, whose nostrils have never been regaled by compounds of Beauvilliers, and whose pulse has never been stretched out to a Halden, is able to combine the health of the Brahmin with the indulgence of the Sybarite.

The human body is formed for labour, and requires it, and this labour is accompanied by perspiration. It is the safety-valve for the heart—the sewer of the secretions—the scavenger for the skin. Those who are thrown repeatedly into perspiration possess, however seldom washed, many advantages over those who have not to undergo severe bodily toil, however often they may use soap and water to the surface.

The bath substitutes an artificial and easy perspiration, and this explains how the people who use it do not require exercise for health, and can pass from the extreme of indolence to that of toil.

The functions for carrying on life are of the nature of a steam-engine and a chemical apparatus; lethal gases are given forth as from a furnace; poisons are produced by every organ; from every function there is residuum, and the body, while soiled by labour, is rusted by repose.

The extremities of the vessels become charged with unctuous matter; the deadened cellules of the epidermis are covered with a varnish, which is partly insoluble in water, and this internal accumulation and external coating prevent the skin from performing its functions, which are not confined to those of shielding the body, but are essential to the chemical processes within. The skin has analogous duties to those of the lungs, supplying oxygen to the blood at the extremity of its course, and when most completely in need of it. It has to aid at the same time the action of the heart. In its health is their health, and its health is cleanliness. Unlike the two other organs, it is placed within man's reach, and confided to his care; and curiously interspersed through it are glands secreting peculiar odours, that the touch and sight shall not alone warn, but a third sense be enlisted in the guardianship, crying aloud on every remissness, and charging and reciprocating every neglect.*

The Russians come out of a steam at 120° to roll themselves in the snow. This is explained by the fervour of the circulation, which enables them to withstand the shock. If so, the strong and healthy might bear it—not the weak and suffering, the octogenarian and the child. The sudden passage from a Russian bath† to a glacial atmosphere is attended by neither shock nor danger; and far from the oppression that would result from the absorption of vital action in the efforts of the heart to overcome the violent contraction of the circulation by the cold, there is a sense of ineffable relief. You seem to take in and throw forth your breath in mere playfulness, no longer dependent upon it momentarily for life. In fact, the lungs and heart are discharged in part from the toil of that unceasing labour

promotes circulation and digestion, without superinducing either exhaustion or fatigue. Whatever may be the cause or causes of the magnitude of the patricians, the effect itself so seldom fails to be produced, that, beyond all doubt, bulk and rank are almost indissolubly connected together in the public mind—the great in person being, without the help of a play upon the words, great also in power.—SIR GEORGE SIMPSON'S "Voyage Round the World," vol. ii., p. 51.

* Recte olet ubi nihil olet.—PLAUTUS.

† In the Russian bath the heat is obtained, as in that of the Mexicans, by stones heated in a furnace, and on which water is thrown. They have seats at different heights, and, by ascending, increase the temperature (the *concamerata sudatio*, as painted in the baths of Titus). They have a cold douche, which descends from the top of the chamber, and is repeated twice during the bathing. They do not shampoo, but with a bunch of birch, with the leaves on, thrash the body all over, laying it along, first on the back then on the face.

which, beginning with the cradle, ends with the grave. Of what service must it not be to aid a machine, the efforts of which, in the most delicate girl, are equal to a steam-engine of fourteen horse-power?*

The bath has the effect of several classes of medicines; that is to say, it removes the symptoms for which they are administered; thus, it is a cathartic, a diuretic, a tonic, a detersive, a narcotic; but the effect is produced only when there is cause. It will bring sleep to the patient suffering from insomnia, but will not, like opium, make the healthy man drowsy; and relieve constipation without bringing on the healthy—as aloe would—diarrhœa; it is thus a drug, which administers itself according to the need, and brings on no after consequences.

This is not a drug in a shop, to be exhibited by prescription after a visit to a patient. It would be something to obtain a new simple, or an improved plan of administering a known remedy in any one disorder. It would be much by such a suggestion to diminish, in a few cases, the pains of sciatica or of rheumatism, the tortures of gout or stone. This is a habit; one which shall become, when adopted, that of the whole people.

To reason out the subject, I should require to be a profound physiologist and physician; but my deficiencies in this respect, and the appearance of presumption in speaking confidently on a medical subject, will not deter me from declaring that of which I have daily and hourly proof, that, with full knowledge of the uses of different degrees of temperature, you have an entire command over those acute disorders which constitute nine-tenths of our maladies. All inflammation, local and general, can be subdued. Gout, rheumatism, sciatica, equally yield. I am inclined to say the same in reference to the plague, were the proper means employed. I am certain of it with reference to the cholera.† As to consumption, that scourge of England, which sits by every tenth domestic hearth among the higher orders, its ravages may be arrested with certainty, I had almost said with ease, if taken in time.

The foregoing statement is not the result of experience, but the anticipation of it. It was written four-and-twenty years ago for a work I was then about to publish, and suppressed at the entreaty of a friend, as being too offensive to the British public. It was, however, printed in a subsequent work fourteen years ago. I now adduce it as having an historical value, and I do so at the suggestion of a friend, whose discrimination and long administrative habits combine to constitute a profitable adviser.

Your curiosity may be awakened as to the effect of such a statement on the medical world, and my answer will be itself a curiosity. It produced no effect at all. The proposition, "Heat is the simplest, the easiest, and the most effective of remedial agencies, and it has the peculiar merit of never having been so much as noticed in any work of medicine," passed by as if no words whatever had been used. I utterly failed in my attempt to secure so much as the attention of one medical man, when it was by means of forms of speech that I addressed myself to their understanding. I then adopted the other process. I built. Then medical men, by the processes of persuasion and reproach, being induced to enter, the road to the brain was opened through the skin. The first bath built was that of Dr. Barter, of Cork. When engaged on it, a friend, residing in Northumberland, came over with an architect, and the consequence was the first private bath in England. Sir John Fife was induced to enter it. The result was the introduction of the Turkish bath into the Great Infirmary of the North. This has been the

most successful operation for several years; but no other infirmary or hospital has followed the example. I have recently received the last yearly report of this infirmary. The number of cases subjected to the action of the bath for the year ending in March, 1861, is above 12,000. It would be superfluous to enumerate the diseases, for the report specifies every disease in describing the alleviation obtained or the cure effected. I subjoin some extracts as a note, and content myself with the general results as given by Sir John Fife in the letter enclosing the report. He says:—"I state as the result of my experience, that in diseases of the skin, joints, liver, and kidney, the action of the Turkish bath is immediate and direct. When it is remembered that in most diseases the important viscera above mentioned are deranged in their action, we see at once in how vast a number of diseases the Turkish bath, by correcting the morbid action of these viscera, must inevitably exercise an influence beneficial and powerful though indirect."

The report of this Infirmary says:—

"The class of cases first submitted to its influence were of a rheumatic character, both *acute* and *chronic*, *lumbago*, *neuralgia*, *sciatica*, and *gout*; and with such beneficial results, that in the course of a few weeks the bath had become most popular, and rheumatic cripples were being brought from all quarters; some with their joints much swollen, and suffering a martyrdom, were conveyed helpless down into the bath, into a species of elysium, where ache and pain vanished as if by magic. One of the worst cases of rheumatic gout that I have seen, was admitted into the hospital, in October, 1860; he was a baker, aged 46; since 1855 he had suffered from the affection in his joints, and had been under treatment here and in another hospital, without gaining any relief; his elbows, wrists, fingers, knees, and ankles were much enlarged and stiffened, so as to cripple his every action. I quote his own words:—"For the last two years I had been getting much worse; during the whole of this period I had very little refreshing sleep, and had continued gnawing and acute pains in all my affected parts. I have experienced much benefit from every bath which I have taken, and can, at the present time (February, 1861), use my hands and arms with much freedom; previously I could not stand alone, now I am able to walk without any assistance." Equally satisfactory results have followed in cases of *dropsy*, the profuse perspirations affording marked relief.

"In *catarrh*, *influenza*, and many affections of the throat and air passages, *diarrhœa*, and *dysentery*, the genial atmosphere of the bath, at a temperature of 130° Fahr., exerts an influence far surpassing the benefit to be obtained by medicine. As a simple illustration, I may mention the case of a gentleman who had travelled from the south, a journey of many hours; he was labouring under a severe cold, and had almost lost his voice; he was easily persuaded to enter the bath, and, in the space of a single hour, had completely recovered his vocal powers, and was enabled to attend a ball the same evening.

"The power the bath unquestionably exercises in equalising the circulation, renders it peculiarly useful in all cases of *congestion* or *stagnation* of the blood, and obstructions of the viscera; hence the averting of the ague fit which I have frequently witnessed, the dispersion of hæmorrhoidal and varicose conditions, the natural (tonic) cure of hernia, and the relief of stomach and liver affections.

"In *scrofula* affecting the *integuments*, *glands*, and *joints*, *incipient phthisis*, and other conditions attending by wasting, the tonic influence of the bath is speedily evinced by an increase of appetite, flesh, and general condition; while, at the same time, the patient himself voluntarily casts off the damp flannel that has chilled his breast for many a day.

"In regard to the treatment of disorders peculiar to females much might be said, and, under medical supervision and direction, much effected by the use of the bath.

"The hypochondriac, the man of no leisure, the book

* The vessels running through the skin would extend in a straight line twenty-five miles; the respiratories coming to the surface of the body, and opening through the epidermis, amount to seven millions.

† In Cork the men employed in cleaning out the brewers' vats, and who have thus been in a Turkish bath, were, during the prevalence of the cholera, free from that disorder. The other workmen in these establishments, at the time, petitioned to be put to that work.

and desk-worm, to whom the bare crossing of the street proves an effort, will have reason to rejoice in what will assuredly relieve him of bile, vapours, and malaise. Should the volunteer drill, the morning canter, the bath, evolve *effete* material, decarbonise the vital current, and emerge with renewed life and vigour.

"During the last year, ending March 31, 1,720 in-patients, 1,778 out-patients, and 8,483 casuals have been treated; and from this number considerable scope has been afforded of testing the effects of the bath, which is thoroughly approved of by the Medical Staff of the Hospital, comprising eight of the leading members of the profession in Newcastle."

I do not consider the bath in the Newcastle Infirmary as a test by which medical men can arrive at a due estimate of what can be effected by heat. They are only making use of perspiration. They are there as yet but in a state of transition, and in that respect, perhaps, their experience is the more valuable, as it smooths the way for others to enter by degrees on a path so perfectly at variance with the present practice, and to the admission of maxims which cannot be otherwise than repulsive and offensive to the body of science who have instituted a code of cure to the exclusion of the most powerful of the agencies which nature had placed at their disposal. Such an avowal will never be made save by men remarkable, and therefore rare; and even in the case of men of high moral worth and intellectual power, a great amount of logical constraint must be brought into play before they will even attend, far less capitulate.

Sir John Fife, in his enumeration of internal organs, has omitted the lungs. This is of necessity, for the amount of heat employed, and the extent in time of its employment, are neither of them calculated in the Newcastle Infirmary bath for more than alleviation. In my experience, however, the lungs figure as the organ over which the largest control is afforded by the use of heat. In the incipient stages it is as easy to stop the disorder as to wash the face. In the further stages, it can be arrested so long as there remains disorganised substance sufficient for the functions of life. What is perhaps more remarkable is, that the substance of the lung already exhibiting signs of decay, can be brought back to the healthy condition. Some patients from the London Consumptive Hospital have been admitted recently to use a small experimental bath, on the premises of the Turkish Bath Company in Jermyn-street. One of the physicians of the hospital, who has watched the case, writes as follows:—

"Three patients affected with consumption have been for some time subjected to the Turkish bath treatment. They were all in an advanced stage of the disease, as the tubercular deposit in the lungs was not only considerable, but had become softened or ulcerated. The general symptoms of all are greatly improved, but the most remarkable circumstance is, that in one case the signs indicating softened tubercle have disappeared, the lung becoming, comparatively, dry and solid."

These patients were simply admitted to the hot chamber for an hour every second day, that is to say, for three hours every week, the temperature not exceeding 140 degrees, as marked by the thermometer. This I should consider as nothing at all, and as not to be rated as a means of action against a morbid state, and yet such were the benefits resulting from these trifling means. The word "bath" is utterly unmeaning. So soon as the operation comes to be regularly performed the word must be dropped, and the annotation, as the case will be, "so many degrees of heat radiating or transmitted, and so many hours of exposure to it."

I could fill a volume with interesting extracts and confirmatory evidence from letters of medical men. Those I have given will suffice to show that the practical commencement has now been made, and that medical science will now have to adjust itself on a new basis, and one not the result of its own discrimination or experiment, but fortuitously presented.

I must here observe that in the East, though the bath serves to secure health, and affords immunity from many of our diseases, it is not there employed as a remedial agent. For that a very different degree of temperature is required. Here the starting point was a stroke of the sun, which I received when without the reach of medical aid, when the idea occurred to me that if I could perspire I should be saved. In consequence of this, I had an ordinary Turkish bath raised to an inordinate degree of temperature, which of course expelled the moisture. I remained in it for six hours, that is, until the constriction of the skin was relaxed, and the perspiration flowed. Out of the incident came subsequently the entire system of hot air as applied to disease.

The next step was at the interval of many years, and occurred to me two years ago, at Berlin, when I fell upon a difference of effect from the manner of the impinging of the heat, and so to the discovery of the existence of a difference between transmitted and radiating caloric. It was to test thoroughly this difference that the experimental bath in Jermyn-street has recently been constructed, and it was in that bath that the results were obtained as regards the consumptive patients, which I have above quoted.

Before leaving the medical aspect of the subject, I have to observe that with mere medicine the physician treats his patients, but here the patient treats himself. He must himself take in and understand what has to be done, and do for himself. He must know that while an agreeable temperature is very sufficient for a habit in health, the force requisite for counteracting disease has to be generated by a high, and the highest endurable degrees of heat. The terms *Hammam*, *Sejac*, and *Thermæ* all mean heat, and if that word were employed by us instead of the inapplicable, the false, and the perverting one of bath, one branch of the lamentable quackery, at present to be listened to, would be excluded. I can assert, in regard to my own experience, that, though patients constantly come to me in desperate circumstances, and given over by medical men, I have never had a death. I can recall no case in which, if a cure has not been effected, alleviation has not been obtained, and a suspension of the progress of disease so long as the means were persevered in. Every man may thus become his own physician, so that what I have to propose is the bath, as a substitute for the hospital.

We have now to glance at a distinct but most important branch—Private baths. The public bath is at best but an expedient. The real thing is the private one. In it alone are the luxuries and enjoyments fully presented, and there is the service to be rendered of stopping malady, or treating it. I have mentioned that of Mr. Crawshay, of Northumberland, as the first so constructed in England. Several years, however, before, one had been built by the Duke of Northumberland, but it fell into disuse owing to the difficulty of procuring the requisite attendance. This is the account of it which I have received from the Duke himself:—

"It is true that I established a Turkish bath in Yorkshire some years ago. In every respect it answered its purpose. But, in England, a proper attendance cannot be supplied for want of suitable instruction."

"Whether the Turkish bath is as efficacious in maladies as you suppose or not, I must leave others to decide; but it is most agreeable; it relieves fatigued limbs most miraculously; and it is not weakening. I never took one except in robust health, and I never felt or heard of any bad effects from it."

The drawing on the wall will show how an apartment in the centre of a house can be adapted for a private bath. It is that in my own country residence. It is so constructed that no patterns are required, and you enjoy the luxury of walking on the marble slabs with the bare foot, the hot air being let in. Here, in the same apartment, you obtain every variety of temperature, from 80 to 220. This chamber contains 3,200 cubic feet. The furnace consumes the same amount of fuel as two ordinary fires. By means of this one fire, independently of heating the baths, five

fireplaces are dispensed with. Two bedrooms in the superior story are entirely heated by the hot air passing from the bath, and four public rooms adjoining to it, on the same floor, are either partially or entirely heated from it. Instead, therefore, of a private bath being an expense, it is a very great economy. At Constantinople, there are 300 public baths and 2,000 private ones.

Having come upon a description of the private bath of an Eastern, written at the time, I think it worth giving you for itself. Some interest may also attach to it, as the name of the personage who built it has, unfortunately for him and for ourselves, become but too well known in this country—it is, Said Jumbellat Druze Sheik of the Lebanon. I read it as it stands in my journal:—

“Emir Effendi and the Caimacan being gone, Izzet Pasha busy with his census, and Sheik Said with his guests, I betook myself to the bath. I had not visited this part of the building before. I did not look for the splendour of Ibtideen, but I was surprised when led through an ante-room that held a wide sofa, into a small cupola of fourteen feet square, with two recesses equally diminutive; one of them containing the *laous*, the plunge bath, or *piscinum* of the Romans. It was neat, however; laid in slabs of Carrara marble, with steps between of their own beautiful stone running through a gamut of shades, from white, or pale stone colour, to brick red, and of a consistency from the friable limestone to flint. Of all species of apartments the bath is the one requiring, and calculated for, the display of marbles and mosaic. That of Sheik Said Bey was the only ornamental part of what remained to him of his palace, and just the thing I have fixed upon for wishing to have, and hoping to live to see, attached to every cleanly gentleman's establishment of modest fortune in my own country. I found, on inquiry, that the bath belonging to the old Serai had been ruined with it, and that this one had been built by Said Bey, and at a cost of about £350. In England it might be built for the same, or less, and, with a better and larger ante-room, might accommodate fifty persons a day.” It was on this type that my own was subsequently constructed.

The bath-going population of Constantinople—the Turkish and Armenian—do not much exceed 300,000. At this rate, and this habit being naturalised among us, we would require for London and its suburbs, 3,000 public baths and 20,000 private ones. This would fall far short of the proportion of Ancient Rome or Alexandria, the Romans going to it daily. This daily practice is commencing in England, and further it is used by the sick. At the rate of Rome we would therefore have to multiply this number by seven. Such is the possible field that is opened to this new enterprise. But then the necessary conditions must be these:—1st, Cheapness; 2nd, the idea on the part of the wealthy of contributing from their superfluities to the well-being of their fellow-creatures.

The baths of Prussia having fallen into dilapidation, Pliny appealed to the Emperor Hadrian in these terms:—“The dignity of the city and the splendour of your reign alike require their restoration.”

In like manner I appeal to you to restore the balnea which the Romans constructed on your soil, for the good of your people and the honour of your name.

This appeal I make with a confidence I could not have felt even a year ago. Then it would have been a mere intellectual conclusion to which I would have pointed. I can now show you practical results. Nerved thereto by those spurious imitations, and not as a commercial speculation, several gentlemen have associated to furnish me with the opportunity of erecting in this metropolis an edifice on the scale of the structures of Constantinople. The drawings and models are there before you; although in the building now far advanced towards completion, there has been a considerable modification, yet these exhibit what a bath ought to be. There have been of necessity changes required by the fuel of this country, and also as to ventilation, the merits or demerits of which it would be premature to enter on. This is the building which I

now can offer you for a model, and I trust that this very evening—and a more auspicious spot could not be selected than this, the Society of Arts—will see a commencement made and the resolution taken, to construct baths, if not for the gratuitous use of the people, at least to be opened to them at a rate not higher than that of ancient Rome, or of the present Constantinople.

Quadrante lavatus rex ibis, says our schoolboy friend, Horace. The slave, his compatriot, went forth a king, having paid but one farthing for the bath that made him feel as such. With all our philanthropy, with all our mechanics, can we not attain to this? If I cannot persuade you, at least suffer me to shame you, into being at once thoroughly clean in yourselves, and really charitable to your fellow subjects.

As to expense, a bath might be had for one quarter of the price of a glass of gin; for we have water in more abundance, and fuel at a cheaper rate, than at Rome or Constantinople.

It is not long since there was not a hot bath to be got in London under two shillings; what would then have been said if anyone had had the hardihood to advance that hot baths might be got for two-pence? and that bathing establishments, charging from one penny for cold baths up to sixpence, should become profitable concerns? Such, nevertheless, is the case. There is here no new idea, no new process, no new demands. It has simply been suggested to build larger establishments, and to throw them open at a smaller sum: so that we have hitherto been deprived of these advantages through the partial blindness of those who have, in so far as they do see, deplored the blindness of others, not thinking that probably other films intercepted their own sight.

I will therefore take the result obtained in these baths and washhouses as the basis of calculation. For a thousand baths the charge for water varies from twenty to twenty-eight shillings; the coals for fuel from fifteen to thirty shillings; the other charges from fifteen to twenty shillings. The most economical rate is fifty shillings for a thousand baths—a little more than a halfpenny a-piece. The allowance of water for each bath is forty-five gallons; fuel enters for one-third into the charge. With the Turkish bath there would be a saving of eight-tenths for water, and probably five-sixths for fuel, and an entire saving for the charge of attendance for the poorer classes (the *σαντων βαλειδουντες*); thus we should have on the thousand baths, the charge for water and fuel reduced from thirty-five to five shillings; the charge for attendance being withdrawn from the poorer classes, the expense would amount to one penny for sixteen baths, or four baths or a farthing.

To these bathing establishments water is furnished at a very low price—fifteen shillings for the one thousand barrels, of thirty gallons. The coals consumed are of an inferior quality, at nine shillings a ton.

The above estimate was set down years before there was any thought of a construction of this kind. It is, therefore, of no more value than that of guess made before trial. I had, unfortunately, neglected to ascertain in the East, the quantities of fuel expended. The problem, as regards England, is by no means solved. There is no point in which we are more backward than in the structure of furnaces. It is but progressively that I am able to get towards the point that must be attained of perfect and complete combustion. Besides, a calculation must be based upon a constantly sustained, not an intermittent heat. Again, the proportional difference of cost is enormous as affected by size. Therefore, large buildings, with the fire constantly kept up, will cause an immense diminution in expenditure. One of the London baths, with all its present defects, gives, as the result of several months, 1 cwt. of coals for every twelve bathers. My own bath, on an experience of three years, gives very different results if calculated by its capacity to receive bathers. The estimate in that case would give 50 bathers for 1 cwt. of coals. The last bath I have constructed, a very small one, being of 420 cubic

feet contents, and yet capable of bathing 50 persons a day, reduces the rate below a farthing for each bather. It would not, however, be considered extravagant if we rated each bather as costing 1d. in fuel, and the experiments already made clearly reduce us below that sum.

But if a new charge be incurred, we have on the other side to look forward to the possibility of retrenchment in consequence of the altered habits of the people. The one that first presents itself is the diminution of maladies, doctors' and apothecaries' fees and drugs, loss of time from sickness and attendance; and here, to say nothing of the different value of life, the saving for London alone will have to be reckoned by millions. Next are temperance and sobriety. At first sight the connection will not appear so immediate; it will, however, be unquestionable to those familiar with countries where the bath is in use. I know of no country, in ancient or modern times, where habits of drunkenness have co-existed with the bath. Misery and cold drive men to the gin-shop; if they had the bath—not the washing-tub—to repair to, this, the great cause of drunkenness, would be removed; and if this habit of cleanliness were general, restraints would be imposed on such excesses by the feelings of self-respect engendered. Gibbon has indulged in speculations on the consequences for Europe that would have followed had Charles Martel been defeated on the plains of Tours. One of these effects would have been, that to day in London there would be no gin-palaces, and there would be a thousand baths.

The poor of England have never had an opportunity of knowing the comfort which is derived on a cold day from the warmth imparted by such an atmosphere. How many of the wretched inhabitants of London go to their chilly homes in the winter months benumbed with cold, and with no means of recovering their animal warmth but by resorting to spirits and a public-house fire.

Consider the heat and steam throughout the manufactories of England, which the instinct of a Russian boor, or Laplander, or Red Indian would apply for the benefit of the miserable population engaged in those works, and now allowed to run to sheer waste. The filthiest population exists, with the most extensive means of cleanliness. A nation that boasts of its steam, that is puffed up with its steam, that goes by steam, does not know how to use steam to wash its body, even when it may be had gratis.

The people that has not devised the bath cannot deserve the character of refinement, and, having the opportunity, that does not adopt it—that of sense. Servility, however, we do possess, and any person of distinction has it in his power to introduce it. That which all despise, when only a thing of use, will be by all rushed after when it becomes a matter of fashion. The sight of a bath of a new fashion, and enjoyed by another people, has impelled me to make this endeavour to regain it for my own. Is Europe ever to remain on the map a black spot of filth? Can she owe the bath only to the Roman sword or Moorish spear? Must she now await the Cossack lance? After ridicule for warning, the day may come when I shall suffer reproach for deprecating the event, and it will be said to me, "These barbarians, who, Providence-like, have come to compose our trouble—Roman-like to teach us to be clean!"

In conclusion I will claim your indulgence for one egotistical remark. I have expended great labour in bringing this matter so far to bear. I have encountered endless disgusts alike from the pride of science and the self-love of ignorance. Over and over again I should have given up the attempt, if not in aversion at least in despair, had it not been for one consideration which never forsook and always sustained me—it was this. Those who are so favoured by fortune as not to depend for their daily bread on their daily and precarious toil, are so very few in number as compared with the rest, that each man so situated has to consider himself, not only as remarkably fortunate, but as bound in a solemn bond to make use of the time so left to his disposal for the good of those who have no time

that they can call their own. Before my eyes were ever present the daily drudgery of the millions of my fellow-men, known as poor, the severity of their toil—the precariousness of their existence—the paucity of their enjoyments. And I have worked on in the hope of bringing within their reach some compensation for their hard lot in a practice which relaxes the frame after the effort of labour, and composes the mind worn by the load of care.

DISCUSSION.

The CHAIRMAN said he was certain that all who had heard this eloquent and interesting paper must have received a lively impression of what a Turkish bath is, and he was certain also that no one would consider it unworthy of consideration and discussion when it was recollected how largely both in modern times, and also in the ancient world, the bath was considered, not only as a domestic, but as an important political and social institution.

Dr. EDWARD SMITH, F.R.S., said they had listened to a very able paper, but he doubted whether they were in a position to discuss it with the calmness and impartiality with which so important a question should be considered. In the first place, he would remark that the paper seemed to turn upon carrying popular feeling in favour of the Turkish bath, without having sufficient evidence on which to form an accurate judgment. They were liable to be led astray by the popularity of the thing; it was one thing to regard it as a popular notion, and another thing to inquire whether it was a necessary, a useful, and a safe appliance. Science had not yet quite settled what was the exact action of the Turkish bath upon the human system. At present the argument of its advocates was the great temporary gratification which accompanied the use of this bath. It was true there had been certain investigations with regard to its action. There could be no doubt it increased pulsation, and increased the action of the heart both in rapidity and in force, that it increased also the amount of air respired. There was not a doubt it increased the action of the skin to a considerable degree, so that it was said that a person might lose as much as 2 lbs. of perspiration in one of these baths. It could not, therefore, be an unimportant agent. He thought it was in the highest degree probable that it ought not to be regarded as an institution fitted for all climates, for all classes of persons, and for people living in all manner of ways. He took it that the use of this bath must be restricted to certain classes. It might do good in some cases and evil in others, and from its nature he thought it could not be universally applied. They had heard that evening that even in Turkey this bath was falling greatly into disuse. As men varied their habits the conditions in which they lived must be varied. The probability was, that the Turks of the present day are different from the Turks of fifty years ago. There might, therefore, be corresponding changes in the appliances used by them. This much was certain, that the action of the bath was to increase the action of the system, and, therefore, to increase waste. No one could deny that. The question was, whether that waste was beneficial to the body or injurious? There was a broad line which separated two classes of individuals. Take the three-bottle men of the last generation, and the teetotallers of the present day—they had two different classes of men. Take the man who was accustomed to eating a large amount of highly-seasoned animal food daily, and the washerwoman whose principal aliment was tea and bread. Take the man in the east, with a high temperature of the atmosphere all the year round, with a deficient amount of necessary bodily exercise, and the man living in our own country, with the variable conditions of climate and food, and they had the human system under totally different conditions, and it would not be said that the same appliances would be equally beneficial under all conditions. It would appear, with reference to this question, as regarded the great masses of this country, that it might be used by the few without influencing very largely the constitution of the English people; but the great question to be considered was its

applicability to the multitude. He hoped they were all desirous of being cleanly, but was it necessary to resort to a Turkish bath, and to perspire in this profuse way, and to spend two hours in order to become clean? He took it they might be cleanly in their persons, and induce habits of cleanliness amongst the working classes, apart from the use of the Turkish bath; and it was quite certain, from the expense and the length of time occupied, it could not be employed by the working classes. If it could be, he believed it would occasion serious injury, speaking in a wide sense. As a whole the working classes were deficient in food and clothing; as a whole they were deficient in vital powers. In such cases they required to support the system; they had nothing to lose; they wanted to gain. He recollected in a lecture, given by Capt. Galton, at Shorncliffe, the broad fact was stated that some men could not afford to be clean. If the skin was so sensitive as it was rendered by the use of this bath they had immense waste. If, on the other hand, they had a less degree of cleanliness, they lessened the action of the skin, and there was a less amount of waste of the system. Persons deficient in clothing, in housing, and in food, as was found to be case in the northern parts of Europe, could not afford to be clean in the sense in which Mr. Urquhart used the term. He had little doubt, however, that for persons living in good society, accustomed to live freely—especially those accustomed to drinking alcoholic liquors, and taking but little bodily exercise—in such cases the Turkish bath might be beneficial—not but that they could be equally relieved by stopping the wine, and beer, and meat. On the other hand, persons of spare habit, or persons who had a skin apt to perspire freely, whose appetite was generally defective, and who, therefore, took less food than was necessary for the support of the system, to them it was clear that the frequent use of the Turkish bath would be prejudicial. If they spoke of it as a luxury, he had not a word to say. It was less harmful than many others, and a man might spend two hours in a bath with much less harm than he could in seeking some other kinds of pleasure. But that could not influence the masses of society, and he believed the Turkish bath, to become of general adoption in this country, must be shown to be a utility and a necessity.

Mr. STEWART E. ROLLAND spoke with less diffidence on this subject, as he had had considerable experience in the use of this bath, whereas the gentleman who had just addressed them had spoken in a great measure theoretically, but had not offered any remark in disparagement of what had fallen from Mr. Urquhart that evening from personal observation. He (Mr. Rolland) should not have been emboldened to speak upon this subject had not his experience in the use of the bath been very extensive, not only in the East and the West, but also in England, where he had watched and fostered, as far as he could, this movement from its earliest commencement in this country. He would not use the word "bath," in reference to this subject, as it was a fallacious term, but he would look to the effect of "heat," as applied to the human form, not only in the cure of diseases, but as opposing their encroachment. He had been a great deal in the society of the Red Indians of North America, and having been elected chief of one of their tribes, he had great opportunities of noticing their observances, and he could state that a religious observance—and also a social and sanitary observance—amongst that people was, the application of heat to induce extreme perspiration, undertaken on the most solemn occasions of a young man's life, or on the occasion of an old man's illness or decrepitude. This habit prevailed amongst all the tribes of the northern regions of America. The wigwam or tent of the most simple kind, raised upon poles, enclosed with skins, was heated by red-hot stones, upon which water was thrown to produce a vapour. The patient was enclosed therein and confined there until a copious moisture exuded from his pores, carrying off with it the seeds of disease, and opening the fountains of health. Passing

from the west to the east he found this practice to exist amongst all classes, in all regions, and as the question of climate had been mooted, he believed he could state facts which would go far to dispel the impressions which the speech of the gentleman who last addressed them might have given rise to. He found that on the burning plains of Assyria down to Babylon, where the thermometer in summer stood at 120 deg. in the shade, the bath was used for the purpose of producing coolness. By its use the skin was relieved from febrile symptoms, and the patient returned into a tropical atmosphere refreshed from his body having been subjected to a higher temperature in the bath. Three days' journey from these plains they ascended the mountains of Armenia, the tops of which were lost in the clouds, and were covered with snow eight months out of the twelve, and the bath was as much resorted to during the eight months of cold as during the eight months of heat in the plains; it was not used as a luxury by the rich, but by all classes of the community, and in the northern regions of Europe, where the summers were hot and the winters cold, they found the use of the bath resorted to in the hot season to refresh and cool the system. Therefore he thought the objection to it on the score of climate was not sustained. He would now say a word with reference to his own experience of the bath in this country. He confessed, with as much shame as one dare express before a meeting of his countrymen, he did not himself bring home those results, and it was not until they were brought before him by Mr. Urquhart that he ventured to communicate the merits of the bath to the humbler classes of his countrymen, for, let him tell them, the inauguration of the application of heat to the human frame had not arisen with the luxurious and wealthy, but with the working men themselves—with the fatigued men, and the exhausted men, and he should not have got a hearing from that class were it not that their own experience told the same tale. Going amongst the artisans of Lancashire, Yorkshire, and other places, directly the subject was introduced, an intelligent working man said, "I understand what you mean; the puddlers in the iron works, and the men in the glass works, who work in a temperature of 300°, are exempt from disease which we, who do not expose the surface of the body to heat, are subject to." He would ask any one to go to the great factories of the metropolis where extensive heat was employed in the processes where the men worked with the smallest amount of clothing possible; and they would find, to use the pithy expression of a workman—all the diseases were "burnt out" of them. The rationale of the matter was extremely simple. When in a febrile state, if they placed the bulb of a thermometer under the tongue it marked fever heat, or 112 deg., then if the patient were exposed to higher heat—10, 20, or 30 degrees higher—moisture exuded from the pores, and the fever ceased; and thus the effects were produced for which medicines were administered by the physician. It was in that respect the working classes would experience benefit in febrile symptoms. When animal food was beginning to be tainted they exposed it to a high degree of heat in cooking, and the progress of decomposition was arrested. He believed the action of the bath was in some degree the same, with this difference—that there was a vitalising principle in a living man which did not exist in dead animal matter. He had attempted to reply to the gentleman who had exclaimed against the use of the Turkish bath, because it would introduce luxurious and enervating habits amongst the working classes. These baths, he would say, had been introduced principally by the working classes themselves, and he might mention the fact, which was stated by a leading member of the House of Commons a short time ago, that in Rochdale Turkish baths had been introduced by the co-operative societies of working men for their own use, which were self-sustaining and profitable, and were resorted to not as a luxury, but as a want supplied. He would say a word as to the question of time required for these baths. He

did not suppose anything could be more likely to furnish an objection in the mind of many present than when the preceding speaker stated that two hours a day was too much time for any but idle and luxurious men to devote to the bath. This was not a fair statement; two hours a week were sufficient. He would give his own experience, not as a resident in London having his own private bath, but as having witnessed the operation in eastern countries. Nobody would maintain that strength resided in perspiration, or that the less they perspired the stronger they were; and, although it was by perspiring they became strong, it was because there was an accumulation of *effete* matter on the surface of the body and insoluble matter within. A certain proportion of the food we take was assimilated, and heat was requisite for assimilation, and the most efficient mode of passing off the unassimilated portions of food was not by resorting to doses of Holloway's pills, but by the more agreeable process of heat through the pores, which were the natural conduit pipes of the human frame. With respect to the time required for the operation, he could conceive that a man whose system was loaded with phosphates and other impurities, would require hours in a Turkish bath to eliminate them from his body, but it was only in such extreme cases that so great a length of time was necessary. Mr. Rolland concluded by mentioning the benefits he had personally experienced from the application of heat in the case of gout, having fitted up a room in his house capable of being heated to 170 degrees.

Mr. WILLIAM HAWES said there were one or two observations in this paper upon which he thought a little practical information would be useful. In the first place these Turkish baths were stated to be the most economical form of bathing; and in the second place the people of our great cities were rather stigmatised as being a dirty class. He would, in the first place, relate what had been the progress of bathing in London, for he had been connected with the establishment of baths for the working classes from the earliest period of their introduction. He would show them how they had progressed; he would also tell them the cost, and leave the meeting to judge whether the Turkish bath described to them that evening, or an ordinary bath taken at the establishment provided for such purposes, was the cheapest and best means of cleanliness for the working classes. The public baths and washhouses were commenced in London about 1847. What had been the result in those fourteen years? They had ten or twelve such establishments, and about one million baths were annually given to the working-classes exclusively, at the small cost of 2½d. each, including towels, and everything decent and proper; and looking at the process described as appertaining to a Turkish bath, he would ask what prospect there was of such baths being given at 2½d. each? Then came the question—did the present system of bathing answer the purpose of promoting the health and comfort of the working-classes? He contended that for the working-classes the occasional use of a warm bath produced a very beneficial effect, and was the very thing to be wished for for the class they were principally intended to benefit. The luxurious and idle, who want stimulants, could take their wine and have recourse to the Turkish bath; but it was clear the working-classes did not want the one or the other; and if they gave the working-man a good bath for 2½d. they did more for him than could be done by any system of Turkish baths. They could ascertain the cost of fuel and water, and all the details of the public baths he had referred to. The fuel cost 1d. per bath. The cost in London was a halfpenny. The cost of the whole establishment of baths and washhouses together was less than 1d. per bath. Just consider 1d. per bath compared with the details which had been given them this evening. It was suggested that the rich should pay the extravagant sum of £1 for a Turkish bath, to enable the poor man to have his bath at a nominal charge, but that would be regarded as a matter of charity. The best thing they had done was to make the baths in London self-supporting,

and let the poor see that the money they pay gives them a bath, because it is applied by the intelligence of other classes and the capital of other classes, for which they pay a remuneration. For his part, he could not sanction the introduction of baths which, if applied to the poor, would be so as a matter of charity. If a medical man saw that a bath of an expensive character was necessary for a poor patient, who would wish to deprive him of it? They would be glad that he should go to some institution and get it, but that was a different thing to the establishment of public baths, as a domestic institution, to which they might resort whenever time or opportunity suited. The public baths were open at all times, and were especially suited for the working classes. But there was another branch of these institutions which was equally beneficial, viz., the washhouses, and the combination of the two was necessary in order to reap the full measure of economy from these establishments. The larger the quantity of water they heated, the more economical it was in proportion. If they had two distinct establishments, neither could be conducted so cheaply as could be done under the present combination. Therefore, whilst they gave baths to the million at 2½d., the washing of the clothes was done at 4½d. per family. These were the results of applying the intelligence and capital of one class to promote the happiness of the other, and yet they made the recipients pay for the benefits that were provided for them.

Mr. T. G. TAYLOR spoke in support of the establishment of public Turkish baths, and mentioned the personal benefit he had experienced from their use in the cure of gout. He believed they had a great tendency to destroy the craving for unhealthy stimulants to the system.

Mr. ERNEST HART remarked that although Turkish baths might be an excellent remedy for gout, yet that was not the question they were met to discuss. If they were to credit medical testimony, these baths would be very prejudicial to many constitutions suffering from particular forms of disease, and therefore they ought not to be resorted to unadvisedly. There could be no doubt that one immediate effect of this treatment was rapid oxidation of the blood, which meant waste, and before they pronounced in favour of Turkish baths they ought to be satisfied that this action was really required by the system. As far as they at present knew, the result of these baths was to produce oxidation of the blood and to increase the action of the skin, and there were a great number of persons upon whom such results would operate prejudicially. With regard to the external application of heat to the body, he could not agree with the analogy, which had been set up by a previous speaker, between the effects of heat upon dead animal matter and upon that which was a living and an evaporating surface, the human body.

Dr. CRISP said they had heard nothing yet as to the effects of this agent in promoting longevity. They were informed by statistics that the average of Roman life was twenty-five years, and the Turks were, for the most part, short lived. In Scotland, however, where it was said the people had no great taste for ablutions, the people lived longer than almost any other people on the face of the earth.

Mr. S. SIDNEY said they must have been struck with the objections urged by the medical gentlemen who had spoken, to this system of baths; but there was one point which had escaped notice, that was—that every word which had been said against Turkish baths—of which they at present knew very little—was formerly equally applied as against washing when it was an equally strange thing. Mr. Hawes had given an interesting account of what baths and washhouses had done for the working classes of London. He (Mr. Sidney) was old enough to recollect that at one time there was an extreme prejudice against washing, and he would illustrate that by mentioning an anecdote. A philanthropic lady who had established a public school in the neighbourhood of a large manufacturing town, told him that there was no difficulty in imparting the ordinary rudiments of education, but the

great difficulty was in getting the girls to wash their feet.

Mr. URQUHART, in reply upon the discussion, attributed the slow progress hitherto of this system of baths in this country to prejudice on the part of the medical profession and others, rather than to the apathy of the public on the subject. Having had long experience in this matter, and having obtained that experience at the expense of much time and money; and also convinced of the great benefit the Turkish bath was calculated to confer, he had been induced to bring forward the subject thus publicly from an anxious desire to impart those benefits to his fellow countrymen. He called upon each one present to examine for himself whether there was any value in this new experience which he offered them. Experiment was always better than theory. Having mentioned a case of speedy recovery from an attack of ague in his own person a few days ago, from the use of the Turkish bath, Mr. Urquhart said, that knowing these results, what should he be if he did not endeavour to impress them upon his fellow countrymen? He was very glad to hear from Mr. Hawes what had been done in the matter of public baths and washhouses in London; he was glad to know that they adopted a more economical method of heating, which he (Mr. Urquhart) should not hesitate to avail himself of. Although competition was, in the abstract, a good thing, yet he did not bring forward his plan in competition with establishments, good in themselves, now in existence. With regard to the time occupied in the processes of the Turkish bath, it would be found that he recommended—not two hours a day, but two hours per week; and so far from that being a diminution of the time of the working-classes he considered it a saving of time, because their work would be better performed. The rector of a large parish in London had informed him that on his asking a labouring man how he could afford to give so much time to the bath? the reply of the man was, because he gained time by it afterwards, that he was stronger for his work, and more able to endure it, and would work for a greater number of hours. The luxury of the bath was one thing, the necessity of it another. He might mention that in the splendid style of appointments and attendance in the baths of Constantinople he had not considered £5 too much to pay for a bath of that character; but in that country the lower classes united together in administering the manipulations of the bath to each other, thus dispensing with attendants. By that means there was such an interchange of feeling between the various classes as they only read of in romance, or in records of past history. It was the exclusiveness of classes in this country that caused the absence of politeness, the absence of cleanliness, and the absence of honesty. If he had been labouring for five-and-twenty years to introduce that which was strange, it was because he looked for the improvement of his fellow-countrymen in these respects—because he felt it would be a step towards promoting honesty, a step towards politeness, and a step towards increasing cleanliness. Thanking the meeting for the attention they had given to his paper he would sit down, expressing a hope that this was but the beginning of a more extended inquiry into the subject than had hitherto been vouchsafed to it.

The CHAIRMAN said, after the very interesting discussion that had taken place, they could do no less than thank Mr. Urquhart for the enjoyment he had afforded them.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 5th inst., a Paper by Mr. Thomas Ellison, "On the the Progress of British Commerce during the last ten years," would be read.

Mr. MONTGOMERY MARTIN, writes:—"I don't think it will be practicable for me to avail myself of the honour which the Council of the Society of Arts have proffered—to

be present at the reading of Mr. Urquhart's exposition on Turkish baths. Having experienced the benefit of those baths in the East, I think it is an advantage to extend their use on sound principles; and no person that I am aware of is better capable of expounding those principles than Mr. Urquhart, to whom is mainly owing their introduction into Britain. As a means of preserving health, of promoting cleanliness, and averting inebriety and its consequent vices and miseries, the Turkish bath may be made a great blessing to the labouring classes. I found them in all large towns in China, and available at an exceedingly small cost. It is well that a Society which has already initiated so much good, and is every day widening its sphere of usefulness, should aid in promoting an extension of the Turkish or hot-air baths."

MEETINGS FOR THE ENSUING WEEK.

MON.....Geologists' Association, 7. Mr. B. Waterhouse Hawkins, "On the Remains of Vertebrate Animals." Entomological, 7. British Architects, 8. Medical, 7. General Meeting for Election of Officers and Council. 8½. Dr. Richardson, "Further Researches on the Therapeutic properties of Peroxide of Hydrogen." Royal Inst., 2. General Monthly Meeting.

TUES. ...Civil Engineers, 8. 1. Mr. E. L. J. Blyth, C.E., "Description of the Loch Ken Viaduct, Portpatrick Railway." 2. Mr. R. P. Brereton, C.E., "Description of the Centre Pier of the Bridge across the river Tamar, at Saltash, and of the means employed in its construction."

Pathological, 8. Photographic, 8. Ethnological, 8. 1. Mr. George Windsor Earl, "On the Shell Mounds of the Malay Peninsula." 2. Dr. Robert Knox, "On the Remains of the Human Crania and other bones in the Church at Hythe." 3. Mr. Edward B. Tylor, "On the Languages of Central America." Statistical, 8. Mr. Horace Mann, "On the Resources of Popular Education in England and Wales, Present and Future." Royal Inst., 3. Mr. John Marshall, "On the Physiology of the Senses."

WED. ...Society of Arts, 8. Mr. Thos. Ellison, "On the Progress of British Commerce during the last Ten Years." Geological, 8. 1. Prof. R. Harkness, F.R.S., F.G.S., "On the Permian Beds of Westmoreland, Cumberland, and Dumfriesshire." 2. Prof. R. Harkness, F.R.S., F.G.S., "On the Position of the Pteraspis Beds, and on the Sequence of the Old Red Sandstones of South Perthshire." Pharmaceutical, 8.

THURS...Royal, 8½. Antiquaries, 8½. Linnæan, 8. Dr. Cobbold, "On the Choroid Gland and Cones of the Retina in the Cod." Chemical, 8. Royal Society Club, 6. Artists and Amateurs, 8. Royal Inst., 3. Professor Tyndall, "On Heat."

FRI.Royal Inst., 8. Professor Oliver, "On the Distribution of the Northern Plants as influenced by Climatal and Geographical Changes." Archæological, 4.

SAT.Asiatic, 3. R. Botanic, 3½. Royal Inst., 3. Mr. Henry F. Chorley, "On National Music."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, February 14th, 1862.]

Dated 6th February, 1862.

- 310. C. Calow, Newton Heath, near Manchester, and J. W. Hirst, Manchester—Imp. in slide valves for steam engines and other similar purposes.
- 312. J. Pitkin, Clerkenwell—An imp. in aneroid barometers.
- 314. Col. R. Shortrede, Brighton—Imp. in the construction of ships of war with armour plates.
- 316. M. Henry, 84, Fleet-street—Imp. in obtaining and applying motive power, and raising and forcing fluids, and in apparatus employed therein. (A com.)

318. E. T. Bellhouse and W. J. Dorning, Manchester—Imp. in the construction of hydrostatic presses suitable for packing and compressing cotton and other materials.
320. J. Tonkin, jun., Pool, Cornwall—Imp. in the manufacture of gunpowder.

[From Gazette, February 21st, 1862.]

Dated 6th November, 1861.

2786. H. D. Bradt, Boston, Massachusetts—Certain new and useful imps. in machinery for lasting and pegging shoes. (A com.)

Dated 18th January, 1862.

136. W. Tice, 16, Downham-road, Islington—Imp. in gas regulators and meters, part of which invention is also applicable for covering various descriptions of metal spindles.

Dated 25th January, 1862.

194. C. West, 2, Derby-street, Westminster—Imp. in the insulation and covering of wire, and in the preparation of the materials for insulating the same.

Dated 29th January, 1862.

236. J. B. Harby, Leytonstone, Essex—An improved method of preserving electric telegraph cables and wires.

Dated 31st January, 1862.

262. P. Scheurweghs and A. J. A. H. De Boisserolle, Paris—Certain imp. in treating fatty and oily matters for obtaining their acidification, and in the apparatus employed therein.

Dated 1st February, 1862.

272. J. Pendlebury, Dukinfield, Cheshire—Imp. in the method of, and apparatus for, lubricating steam engine cylinders, slides, and other surfaces.

274. J. Deprez, Anzin, France—Imp. in machinery or apparatus for extracting coal, ores, and other mineral substances from mines.

Dated 3rd February, 1862.

288. W. Clark, 53, Chancery-lane—Imp. in processes for preserving and colouring wood, denominated xylochromic and xyloplastic processes. (A com.)

Dated 4th February, 1862.

292. P. Gardilanne, Dax, France—Imp. in the manufacture of metallic wire fencing.

294. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of hard and soft soaps, and in the preparation of liquids for washing linen and other textile fabrics. (A com.)

296. W. W. Williamson, High Holborn—Imp. in apparatus for drying clothes and fabrics.

Dated 5th February, 1862.

306. W. Campion and H. Johnson, Nottingham—Imp. in machinery or apparatus for making the welts of hose or other articles made of looped or knitted fabrics, applicable also for other purposes.

Dated 7th February, 1862.

322. R. A. Brooman, 166, Fleet-street—Imp. in stereoscopic albums, books, and cases. (A com.)

324. P. Shaw, Edinburgh—Imp. in lamps.

326. W. E. Gedge, 11, Wellington-street, Strand—An improved portable thrashing and winnowing machine and apparatus for working same by horse power. (A com.)

328. W. Clark, 53, Chancery-lane—Imp. in preserving timber, which are particularly applicable to the timbers of ships or other maritime structures. (A com.)

330. W. H. Bartholomew, 2, Warwick-villas, Leeds—Imp. in barges or vessels suitable for the navigation of canals and rivers.

Dated 8th February, 1862.

332. J. S. Woodhouse, Cheapside—Imp. in hooped skirts.

336. J. Webster, Birmingham—An imp. or imps. in the manufacture of certain descriptions of nails, bolts, spikes, and pins.

Dated 10th February, 1862.

338. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the treatment of coprolites and other fossil phosphates of lime. (A com.)

340. J. Dickson, 66, Tollington-road, Holloway—Imp. in voltaic apparatus and in the production of voltaic electricity.

342. J. Busfield and J. Eastwood, Bradford—Imp. in machinery or apparatus for preparing wool for dyeing and spinning.

344. L. R. Bodmer, 2, Thavies-inn—Imp. in hydraulic oil presses.

356. J. Danks, 66, Webber-row, Waterloo-road—Imp. in the manufacture of door mats and hearth rugs.

348. A. Munck and H. A. Myhre, Berners-street, Oxford-street—Imp. in ships' logs.

Dated 11th February, 1862.

352. C. Bonell and W. M. Spiring, Wednesbury—A new or improved rotary engine.

354. W. Macnab, Greenock—Imp. in steam engines.

362. Captain F. J. Bolton, 7, Bolton-row, Mayfair—Imp. in rifle and gun stoppers and oil bottles.

Dated 12th February, 1862.

368. T. Coltman, Leicester—Imp. in sewing machines.

372. T. Spencer, Liverpool—Imp. in propellers for navigable vessels, and engines for actuating the same, parts of which are applicable to other purposes.

374. T. Horsley, jun., 10, Coney-street, York—Imp. in breech-loading fire-arms.

Dated 13th February, 1862.

380. W. Hewitt, Birmingham—Imp. in rein holders.

382. W. H. Brown, Camberwell—An imp. in yards, fore and aft booms, and gaffs.

386. F. F. Lawton and J. Lawton, Vale Mill, Micklehurst, near Stalybridge—Imp. in the manufacture of flannel for shirts and other articles of apparel.

388. W. D. Allen, Laithfield-house, Norfolk-road, Sheffield—Imp. in the manufacture of stamp heads and beds employed in crushing ores and other mineral substances.

390. E. E. Allen, 5, Parliament-street, and J. Stewart, Blackwall—Imp. in the construction of steam-engines.

392. E. Green and J. Newman, Birmingham—Certain imp. in buttons for fastening and ornamenting articles of dress.

394. A. Jansen, Brussels—A new ball for fire-arms.

INVENTION WITH COMPLETE SPECIFICATION FILED.

378. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in the disinfection of animal excretions, and in the extraction therefrom of fertilizing elements for agricultural purposes. (A com.)—13th February, 1862.

PATENTS SEALED.

[From Gazette, February 21st, 1862.]

February 21st.

2115. J. Driver and J. Jessop.

2118. H. B. Coathupe.

2123. G. Nye.

2124. A. Lechene and C. Nathan.

2126. F. Tolhausen.

2130. H. Attwood.

2135. J. C. C. Azémar.

2140. A. Granger.

2148. S. Corbett.

2166. J. Bishop.

2174. C. Pemberton.

2186. W. Muller.

2244. G. H. Birkbeck.

2262. G. H. Birkbeck.

[From Gazette, February 25th, 1862.]

February 25th.

2125. J. L. Field.

2133. L. M. F. Patureau.

2138. J. M. Hart & R. Lavender.

2141. J. Ronald.

2142. B. Browne.

2146. J. Duncan.

2156. R. Shaw.

2161. H. W. Spencer.

2163. J. Harris.

2171. P. Taylor.

2172. T. M. Jones.

2177. J. Jones.

2187. J. Hall.

2188. J. Watson.

2189. E. Algan.

2190. A. Saleres.

2192. W. Campion & H. Johnson.

2193. D. Ward.

2195. E. Suckow and E. Habel.

2208. F. E. Schneider.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, February 21st, 1862.]

February 17th.

497. G. Turnbull.

February 18th.

490. S. Ridge.

512. C. W. Siemens.

- February 19th.

491. W. Ashton.

[From Gazette, February 25th, 1862.]

February 20th.

503. J. Crosland.

February 22nd.

485. E. Lund.

498. H. B. Barlow.

506. J. Dale.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, February 21st, 1862.]

February 18th.

431. Capt. A. T. Blakely, R.A.

February 19th.

386. F. Prince.

[From Gazette, February 25th, 1862.]

February 20th.

389. P. Prince.

February 21st.

409. B. A. Murray.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4437	January 10.	Miers's Machine for Cutting and Drawing Ovals	William John Miers	15, Lamb's Conduit-passage, Red Lion-square, W.C.
4438	" 16.	Field Register Folio	James Fox Bland	Capt. H.M. 76th Regiment.
4439	February 10.	Bell and Pratt's Improved Diamond File	Charles Bell and John Pratt	Kettering, Northamptonshire.
4440	" 15.	An Office Pin	Zaccheus Shrimpton	Bedditch.
4441	" 18.	Jar	Wm. Powell and Sons	Temple-gate, Bristol.
4442	" 19.	A Gentleman's Scarf	Alfred John Rix	115 and 116, Cheapside, E.C.

Journal of the Society of Arts.

FRIDAY, MARCH 7, 1862.

INTERNATIONAL EXHIBITION OF 1862.—SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

It is understood to be in contemplation to appropriate to those who take Season Tickets at an early date a certain number of reserved seats for the Opening Ceremonial on the 1st of May.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £446,600, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

With the exception of a sheet or two of glass which still require to be fixed, the eastern dome may be pronounced to be completed, as far as external aspect is concerned; internally some small portion of the upper part of the scaffolding has been removed, and preparations have been made to lower the rest as expeditiously as possible, as soon as the decoration is finished. With the greatest exertion, however, the task will take more than a fortnight to accomplish, and until then the flooring of the dais, and the erection of the fountain which is to occupy its centre, cannot be commenced. The western dome is very little behind its fellow, and it seems probable that the flooring of the two daises will begin together.

Mr. Crace is entitled to high praise for the very rapid manner in which he has pushed on the decoration. For the third and last time the travelling scaffold has traversed the nave, and as soon as the three last ribs are coloured it will be pulled down. The great service which it has rendered, both to the contractors and to Mr. Crace, certainly reflects much credit on its constructor, Mr. Clemence. As fast as it advances, the rails upon which it has been running are taken up and the flooring laid over the nave,

and, in order to make room for this latter part of the work, the steam-hoist, which was used for raising materials to the top of the eastern dome, has been removed.

In the North Courts the floor is being laid with great expedition. It has been decided to run a narrow gallery along the north side of the two extreme Courts, and this is now in course of construction; it will have the effect of breaking the rather blank look of the wall which forms the south side of the refreshment rooms.

In the western annexe so much remains to be done that there is still cause for some anxiety. In 1851, at the corresponding date of the 1st of March, a considerable portion of the machinery was not only in the building, but fitted; as yet, only a small portion of machinery from Switzerland has been received. With the very great resources, however, which are available on the present occasion, this anxiety must not be allowed to continue. Two steam cranes, patented and constructed by Messrs. Chaplin, of Glasgow, are at work in the annexe, and will be of great use in raising and transporting large pieces of machinery. A portion of this building will be reserved for a third-class refreshment court, and cellars have been constructed underneath it. Six large boilers are to find place in the boiler house, which is being built at the north-western corner of the Horticultural Garden; three of these are already on the spot, and one is fixed. The steam pipes have been laid in two double rows along the length of the annexe.

The eastern annexe is comparatively in a more advanced condition, as the preparations necessary for the reception of machinery in motion have not to be made here. The bays, which are to contain agricultural machinery and implements, are already floored, and the spaces allotted to exhibitors are marked out in them.

Some time must elapse before the contractors can take possession of the refreshment courts, as the plaster will require a continuance of fine weather to allow it to dry. Meanwhile, Messrs. Veillard and Martin, the French contractors for refreshments, have taken possession of the row of offices beneath the north-western picture gallery, and have made arrangements to supply the staff of Her Majesty's Commissioners with luncheons, &c. It is to be regretted that they have produced an unfavourable impression by a high tariff of charges, which augurs badly for their success when put into competition with the English contractors.

Mr. Crace has succeeded in colouring and decorating the great picture galleries in a very effective manner, and with a rapidity truly surprising. On Saturday afternoon 75 feet run of wall, 30 feet high, was painted in a quarter of an hour. Mr. Redgrave has already taken possession of the eastern gallery, and is thus in a

position to arrange for the hangings of the British pictures, which are coming in very rapidly, and have hitherto found a location in the corridor beneath the gallery. A large number of pictures have been sent in for exhibition, the merits of which are doubtful, and these have been temporarily placed in the council room of the Royal Horticultural Society.

From abroad goods are beginning to come in fast, our own colonies taking the lead. Among these are three cases from St. Helena; 58 from Liberia; 53 from Prince Edward's Island; and 25 from Newfoundland. Of foreign countries, Switzerland was first on the spot with 64 cases, principally machinery, from St. Gall; then we have 20 cases of furniture from Bremen; two large masses of building stone from Prussia; six cases from Russia, five of which contain articles in malachite, and are of considerable value; and three pictures from Denmark.

EGYPT.

M. Auguste Mariette and Sulfi Effendi will shortly arrive in this country to represent the interests of the Egyptian exhibitors at the coming Exhibition.

TWELFTH ORDINARY MEETING.

WEDNESDAY, MARCH 5TH, 1862.

The Twelfth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 5th inst., Thomas Bazley, Esq., M.P., in the chair.

The following candidates were proposed for election as members of the Society:—

Alexander, Francis	103, Leadenhall-street, E.C.
Brown, Alfred	25, Newman-street, Oxford-street, W.
Capper, Walter	69, Gracechurch-street, E.C., and 3, Kidbrooke-terrace, Blackheath, S.E.
Chambers, Thomas, jun. ..	55, Coleman-street, E.C.
Clarke, G. Somers	20, Cockspur-street, S.W.
Davis, Geo. Henry, LL.D.	Religious Tract Society, 56, Paternoster-row, E.C.
Donne, William, jun.	51, Cheapside, E.C.
Edwardes, Alfred	Warwick-house, Regent-street, W.
Gooch, Thomas	Seacombe-lodge, Clapham-park, S.
Hollow, James	1, Crown-court, Old Broad-street, E.C.
Jordan, Henry	17, Gracechurch-street, E.C.
Lawes, Thomas	65, City-road, E.C.
Lines, John Phillips	Lloyd's Patriotic Fund, County Chambers, 14, Cornhill, E.C.
Macrae, Alex. Septimus ..	18, Chapel-street, Liverpool.
McCrac, Henry Chas.	Halifax, Yorkshire.
McEwen, David Painter ..	Highwood-house, Mill-hill, N.W.
Morse, Hon. F. H.	Consulate of the United States of America, 67, Gracechurch-street, E.C.
Mottram, John	Boy-court, 35A, Ludgate-hill, E.C.

Moulton, Stephen	Kingston-house, Bradford-on-Avon, Wilts.
Patten, William	22, Old Fish-street, E.C.
Porter, Robert	29, Great St. Helen's, E.C.
Prince, George	204, Upper Thames-st., E.C., and 32, Clifton-road, Clifton-hill, N.W.
Robinson, John	Durban, Natal.
Skipper, Chas. jun.	1, St. Dunstan's-hill, Great Tower-street, E.C.
Smith, James	69, Coleman-street, E.C.
Spargo, Thomas	224 and 225, Gresham-house, Old Broad-street, E.C.
Walton, Christopher	24, Ludgate-street, E.C., and Highgate, N.
Watney, Norman	The Brewery, Pinlco, S.W.
Weston, Edward	Rokeby-house, Hornsey, N.
Whitaker, Joseph	Seaforth, near Liverpool.
Whitaker, William	Bradford, Yorkshire.
Wright, Philip	20, Adelaide-rd. North, N.W.

The following candidates were balloted for and duly elected members of the Society:—

Andsley, Geo. Ashdown ..	1, Canning-chambers, South John-street, Liverpool.
Armstrong, Walter	69, Aldermanbury, E.C.
Beaumont, John A.	14, Cornhill, E.C., and Wimbledon-park-house, Wimbledon, S.W.
Beckley, Robert Whittingham	5, Ludgate-street, E.C.
Brown, David	19, Bucklersbury, E.C.
Capel, James	5, Throgmorton-street, E.C., and 62, Westbourne-ter., W.
Chandler, Thomas	1, Bank-buildings, E.C.
Clode, Nathaniel	73, Avenue-road, Regent's-park, N.W.
Coles, Wm. Fletcher ...	5, Aldermanbury Postern, E.C.
Conisbee, William	18, Webber-street, Blackfriars-road, S.
Coombs, Thos. Merriman ..	13 & 14, Ludgate-st., E.C., and Clapham-common, S.
Craddock, John Chase ...	16, Bishopsgate-st. Within, E.C.
Curtis, Robt. M.	6, The College, Doctors'-commons, E.C.
Dahlke, Julius G.	Hereford-lodge, Old Brompton, S.W.
Daw, George Henry	57, Threadneedle-st., E.C.
Dixon, Thomas Ogdan ...	Steeeton, via Leeds
Drew, Richard	9, Mincing-lane, E.C.
Eamonsen, Joshua James ..	11, Dowgate-hill, E.C., and 2, Richmond-terrace, Hackney, N.E.
Engall, Thomas	15, Euston-square, N.W.
Garland, Robert	Belfiore-lodge, Highbury, N.
Gibson, Henry	113, Lower Thames-st., E.C.
Gladstone, W., F.R.G.S.	57½, Old Broad-street, E.C.
Gray, Thos. William	114, Fenchurch-street, E.C.
Grimwade, Charles	3, New Earl-street, E.C.
Harris, Henry	34A, Moorgate-street, E.C.
Harrison, John	2, George-yard, Lombard-st., E.C.
Hayward, T. Carlyle, jun.	3, Highbury-park North, N.
Henderson, Henry	1, Gutter-lane, Cheapside, E.C.
Hills, Thomas Hyde	45, Queen Anne-street, W.
Howes, M. H.	The Elms, Bedford-park, Croydon, S.
Hudson, G. F.	23, Bucklersbury, E.C., and Borough-heath, Epsom.
Jerrard, James Thurgar ..	163, Fenchurch-street, E.C.
Johnstone, William	48, Gresham-street, E.C., and Ladywell-cottage, Lewisham, S.E.
Jones, Richard	30, Botolph-lane, E.C., and 1, Belmont-vil. Richmond, S.W.

Killick, Joshua Edward	7, Ludgate-hill, E.C.
Lukyn, Edward	35, New Broad-street, E.C.
Macdonald, Alexander	3, Rotunda-place, Aberdeen.
Munday, Charles	86, Snow-hill, E.C.
Norbury, John	{ 5, Throgmorton-street, E.C., and 30, Gordon-sq., W.C.
Ogston, George Henry	22, Mincing-lane, E.C.
Parfitt, William	{ 2, Stanhope-pl., Mornington- crescent, N.W.
Payne, Charles	56, Old Broad-street, E.C.
Porter, Robert	12, Billiter-street, E.C.
Shakespeare, William	10, Austin-friars, E.C.
Smith, James	{ 69, Coleman-st., E.C., and 21, Duke-street, Edinburgh.
Southgate, John	76, Watling-street, E.C.
Stapleton, Jas. E., jun.	{ 62, Cannon-st., E.C., and May- ville-lodge, Lee-park, S.E.
Tomlin, James	{ Haringay-park, Hornsey, N., and St. John-square, Clerk- enwell, E.C.
Walker, Thomas Collier	Saint Luke's Hospital, E.C.
Whitmore, Wm. Fred	{ 16, Bishopsgate-street Within, E.C.
Wilson, George	{ 59, Threadneedle-street, E.C., and 23, St. Mary's-road, Peckham, S.E.
Wood, Humphrey Wil- liams	{ 11, Denbigh-place, Belgravia, S.W.
Wood, James Templeton, M.A.	{ 24A, Gresham-street, E.C.
Wright, Anderson	29, Great St. Helen's, E.C.

Previously to the reading of the paper, the Secretary called attention to a new form of inhaler, exhibited by Messrs. Curtis and Co.

The Paper read was—

ON THE PROGRESS OF THE COMMERCE OF GREAT BRITAIN DURING THE TEN YEARS, 1850 TO 1860.

By THOMAS ELLISON, F.R.S.

One of the most obvious uses of the forthcoming International Exhibition will be the data it will supply to all inquiring minds for instituting a comparison between the present state of Arts, Manufactures, and Commerce, and their condition as represented in the maiden Exposition of 1851; and there can be no doubt that even the least intelligent of the visitors to the great Exhibition of 1862 will instinctively draw comparisons between what they may witness there and what passed under their notice at the "World's Fair" eleven years before. The practical lessons which will unquestionably be thus derived by all classes of society will, independently of all other considerations, be such as to amply justify the repetition of the experiment of 1851.

The public mind is already curious to know how we, as an industrial nation, shall acquit ourselves before the host of competitors whose products will be placed in juxtaposition to our own; what will be the comparative progress in respect of time, and the relative progress with regard to the advancement shown by other countries; whether, whilst having bettered the character of our domestic products, we shall have equalled or exceeded the improvements realized by the peoples of other nations.

It is quite possible that in some branches of the arts and manufactures of the less substantial kind, we may still find ourselves, as we have always been, chiefly in consequence of the absence of certain climatic requirements, behind some of our continental neighbours, but in the main it is pretty certain that our display will be such as to enable us to maintain that high industrial position which it has been our privilege to hold amongst the nations of the earth during the past few generations.

Whatever may be the extent and character of our progress, as to the quality of our artistic and manufactured products, there can be no question that, as to the quantity and substantiality, our improvement has exceeded the most sanguine expectations of our own people, and the highest achievements made by other countries. In no previous decade in the commercial history of Great Britain has our trade shown a proportionate increase anything like equal to the augmentation between 1850 and 1860. Indeed, if we take the figures relating to the real value of our exports, we shall find that the positive increase during the ten years named, is greater than that of the previous thirty years. Taking the official value, which is a true index of quantity, we find that whilst the exports of domestic produce and manufactures show an increase of 80 per cent. between 1850 and 1860, the increase between 1840 and 1850 was only 71 per cent. The difference of 9 per cent. is highly important when we take into consideration the magnitude of the figures we are dealing with.

In 1850 the declared real value of the total exports of British and Irish manufactures and produce was £71,367,000, or 15³/₄d. per head of the world's population (excepting, of course, the inhabitants of the United Kingdom); and in 1860, £135,842,000, or 27¹/₄d. per head; a most gratifying increase of £64,475,000, or 11³/₄d. per capita. The important advance in general prices, both as regards raw materials and labour, which has taken place during the past ten years, has contributed largely towards the increased money value of our exports. The official values enable us to arrive at an approximation of the extent of this disturbance. As follows:—

PRODUCE AND MANUFACTURES OF THE UNITED KINGDOM EXPORTED.

	Official Value.	Real Value.
1850	£175,437,000	£71,367,000
1860	315,711,000	135,842,000
Increase per cent.	80	90

Whereby it will be perceived that though the real value exhibits an increase of 90 per cent., the official shows one of only 80 per cent., the difference of 10 per cent. being the amount of the advance in prices which has taken place since 1850.

Of the increase of £64,475,000, £21,615,000 belongs to the trade with the Isles and Continent of Europe, £17,813,000 to Asia, £13,697,000 to America, £7,121,000 to Australasia, and £4,229,000 to Africa.

Taking the countries in the order given in Table I., our trade with Russia has increased from £1,455,000, or 5³/₄d. per capita, to £3,268,000, or 10³/₄d. per capita; considerably more than double in amount, or about double in relation to population. The increase to the northern ports was about £1,588,000. The exports of iron alone advanced from £36,000 to £63,000; those of machinery from £174,000 to £631,000. This latter fact, together with the decrease which has taken place in the exports of cotton manufactures, especially during the last four years of the decade, and the large increase in the imports into Russia of raw cotton, prove that the home manufacturing system of the empire has made considerable strides of progress. In 1850 our exports of cotton manufactures and yarn to Russia amounted to £304,000, in 1857 they reached £816,000, in consequence of the decreased home production during the war; but in 1860 the figures fell to £267,000. During the same period our shipments of raw cotton to Russia fluctuated between 362,000 cwts. in 1850, 279,000 cwts. in 1857, and 496,000 cwts. in 1860; whilst the total consumption of cotton in that country advanced from 150,000 bales in 1850 to 400,000 bales in 1860. But though the movement in respect of cotton manufactures has been one of decline, the other textiles show a favourable comparison. In 1850 our exports of linen manufactures and yarn were valued at £11,000, in 1860 they reached upwards of £40,000. Woollen manufactures and yarn rose from £366,000 to £430,000, and silks from £8,000 to £17,000. The direct trade of Russia has been greatly

augmented during the past few years, and some descriptions of foreign and colonial produce exported hence have, during the past three or four years, exhibited a declining tendency. In 1853 the imports from the United States into Russia amounted to only £609,000, in 1859 they reached £1,401,000—an increase of over one hundred and thirty per cent. in six years; during the same period the increase in the imports from Great Britain was under seventy-five per cent. The trade with China increased from £569,000 in 1853 to £1,199,000 in 1859, or more than one hundred and ten per cent. There is little of importance to note respecting the commerce with the southern ports of Russia.

The exports to Sweden have increased more than three-and-a-half fold, having risen from £151,000, 10½d. per head, to £550,000, or 31¾d. per head. The increase consists mainly of the textile manufactures and machinery. The trade with Norway during the ten years has more than doubled, the shipments having advanced from £211,000, or about 3s. per head, to £495,000, or about 6s. 3d. per head. The articles chiefly effected were coals (£14,000 to £56,000), iron (£22,000 to £87,000), machinery (£12,000 to £90,000); cotton goods show an increase of £20,000 (£49,000 against £29,000), but yarns a decrease of £23,000 (£4,000 against £27,000). Woollen goods and yarn have advanced from £28,000 to £72,000.

Our business with Denmark has improved to the extent of about 60 per cent., that is, from £455,000, or 3s. 9½d. per capita, to £730,000, or 5s. 5½d. per capita. Of the £275,000 of increased exports, £72,000 consist of coal, £79,000 of iron, £74,000 of cotton manufactures and yarn, £13,000 of linen manufactures, and the balance of other articles. Of woollens there has been a decrease of £17,000 (£58,000 to £41,000).

Of the increased shipments to the continent of Europe, by far the largest proportion was taken by Prussia and the minor German States, the amount being £6,035,000—or £13,492,000 against £7,457,000. The per capita rate was 4s. 6d. in 1850, and 7s. 5½d. in 1860. Prussia's share of the increase was £1,460,000, and consisted mainly of cotton yarn and wrought and unwrought iron, the increase being £608,000 and £147,000 respectively. Of cotton manufactures the shipments only advanced from £3,300 to £60,000, whilst yarns rose from £22,000 to £631,000. In 1850 Prussia took barely £6,000 worth of machinery; in 1860, she purchased £73,000 worth. No doubt there is some connection between these figures and the facts that her imports of raw cotton from England alone increased, during the same period, from 10,000 cwt. to 137,000 cwt.; and that the number of cotton spindles in Prussia rose from 264,000, in 1855, to 333,000, in 1858, or over 26 per cent. in three years. Prussia is a good customer for foreign and colonial produce, and the computed real value of this branch of commerce has risen from £625,000, in 1856, to £955,000, in 1860.

To the Hanse Towns our exports have increased from £6,755,000 to £10,364,000, a difference of £3,609,000. Of this surplus nearly one-half, or £1,766,000, was in woollen goods and yarns; £206,000 in raw wool; £464,000 in linen goods and yarn; £285,000 in silk manufactures; £100,000 in machinery; and the remainder in other articles. It is curious to notice that, though the exports of cotton goods to the Hanse Towns exhibit an increase of £331,000, the exports of cotton yarn show a decrease of £295,000—the shipments in quantity having fallen from 44,000,000 lbs., in 1850, to 39,900,000 lbs., in 1860. This, and the small comparative increase in cotton manufactures, and the large increase in machinery (£85,000 to £183,000), is owing to the great stimulus which the consumption of raw cotton has received during the past ten or fifteen years: the deliveries to the German spinners in 1860 being 307,000 bales, against only 86,000 in 1850. The shipments of cotton from England have increased from 213 cwt. to 434,000 cwt. In 1854 the Hanse Towns took from us £2,720,000 worth of foreign and colonial produce, and in 1860, £3,415,000.

After Germany, our largest European export trade is done with Holland, whilst, in proportion to its population, the extent of our commerce with that kingdom exceeds that of any other foreign country. The total value of the shipments to the low countries, in 1850, was £3,543,000, or over 23s. 6d. per head, and in 1860, £6,114,000, or above 34s. 9d. per head. This anomaly is explained by the fact that the trade with Holland is, in a large measure, a transit one, especially that branch carried on with Great Britain. At least one-half of our exports to Holland go forward to different sections of the Zollverein; but even then the Dutch would be by far our best customers in Europe. The increase of £2,571,000 consisted of £882,000 in cotton manufactures and yarn; £520,000 in woollen manufactures and yarn; £220,000 in silk manufactures and yarn; £200,000 in wrought and unwrought iron; £144,000 in oil; £95,000 in leather; and the remainder in other articles. Of foreign and colonial produce, Holland took from us £3,638,000 worth, against £2,321,000, in 1854. The principal articles are cotton, coffee, indigo, silk, and oil. The consumption of raw cotton in Holland, in 1850, was about 54,000 bales; in 1860, the amount was 117,000 bales, rather more than double.

Our commerce with Belgium improved, with some fluctuations, from £1,136,000, or about 5s. 1d. per capita, to £1,612,000, or just under 7s. per capita. In 1858, the exports amounted to £1,815,000; the increase of £203,000, as compared with 1860, was composed of £60,000 worth of copper, £83,000 worth of linen yarn, and £60,000 worth of cotton yarn, the latter being caused by the reduced production of yarns in Belgium, in consequence of the partial failure of the supply of raw cotton from America, the shipments from the United States to Belgium having fallen from 27,157,000 lbs., in 1852, to 9,345,000 lbs., in 1858. Our exports of cotton manufactures to the Netherlands have been almost stationary, whilst the shipments of cotton yarn have positively declined from £158,000, in 1850, to £40,000 in 1860. Our exports of silk manufactures have also fallen off, and the trade in woollens has almost stood still, but the linen figures have risen from £67,000 to £98,000. The stationary condition of the amount of our textile exports to Belgium is the result of the high protective import duties levied upon manufactures by that kingdom. The recent commercial treaty made between Belgium and France, has called the attention of our government to the matter, and negotiations are already on foot to secure the same reductions in favour of British which have already been conceded to French manufactures. In all kinds of metals and metal manufactures there has been a large increase. Machinery has advanced from £22,000 to £116,000, and iron from £39,000 to £98,000. The exports of coffee, pepper, rice, and tobacco show each a large increase.

Our exports of domestic produce to France have increased from £2,402,000, or 15½d., to £5,250,000, or 31¾d. per head, an improvement of £2,848,000, or over 118 per cent.; and it is a pleasing fact that the figures of 1861 show an additional increase of about £3,646,000, thanks to the operations of the recent commercial treaty. There is yet room for a still further improvement, and there is every reason to expect that the per capita consumption of British manufactures and produce will shortly be double the present rate (about 4s. 6d.), for even then it would only be equal to the amount taken by Germany in 1860. The augmentation in the shipments to France during the decade under review consisted mainly of £345,000 for coals, £142,000 for copper, £300,000 for iron, over £300,000 for oil, £447,000 for woollens and wool, and £338,000 for raw and manufactured silk. France is the only country in the world to which our exports of foreign and colonial produce exceed in value the entire amount of domestic shipments. The two items were, in 1860, £5,250,000 for home manufactures, &c., and £7,451,000 for foreign and colonial products, the latter amount being one-fourth of the total exports of foreign produce to all parts of the

world. Of these seven and a half millions, £3,328,000 consisted of silk, raw and thrown, £1,176,000 of wool, £306,000 of raw cotton, £225,000 of indigo, £211,000 of copper, and the remainder of other articles. Our trade with France has suffered considerable fluctuations. In 1850, the exports, as already observed, amounted to £2,402,000; in 1856, they reached £6,432,000; in 1858, they fell to £1,863,000; and in 1860, rose again to £5,249,000.

The population of the Channel Islands has been almost stationary, but their consumption of British goods has advanced from £3 10s. 0½d., to £4 11s. 1¾d. per capita.

The trade with Spain has received a very considerable impulse. Adding the exports to the Spanish kingdom and those to Gibraltar together, the increase during the decade was 190 per cent.,—from £1,253,000, or 1s. 9¾d. per head, to £3,635,000, or 4s. 4¾d. per head. In 1850, our shipments to Spain proper only amounted to £865,000, but in 1860 they reached £2,471,000. Of the increase of £1,606,000, £539,000 consisted of iron; £235,000 of machinery; £126,000 of coal; and £173,000 of linen manufactures. The exports of cotton manufactures show an increase of only £41,000, or 54 per cent, but the imports of cotton wool into Spain for six years only (1851-1856) increased about 80 per cent. The export of carriages of all sorts rose from £1,500, in 1850, to £35,600, in 1860. The shipments of foreign and colonial produce have decreased steadily since 1857, from £532,000 to £150,000, the decline consisting almost entirely of breadstuffs.

Our commerce with Portugal has not increased in an equal ratio to that with Spain, but in proportion to its population, Portugal consumes double the value of British manufactures taken by her neighbour. In 1850, the purchases of the Portuguese amounted to £1,077,000, or 5s. 8d. per head, and in 1860 to £1,787,000, or over 9s. per head. The exports of cotton goods exhibit an increase of £180,000, but yarn has positively decreased, especially during the past five years. Iron advanced from £61,000 to £161,000; silk manufactures from £1,000 to £41,000; butter, from £80,000 to £110,000. In 1850, we exported no raw cotton to Portugal, but in 1860 we sent £44,000 worth. The shipment of tea in 1850 was only 800 lbs., but in 1860, 450,000 lbs. were exported. The trade in rice, sugar, and some other colonial products has also advanced considerably, though with some fluctuations.

We now come to Italy and the Italian Isles, with which our trade has advanced from £3,107,000, or 2s. 8¾d. per head, to £5,220,000 or 4s. 3¾d. per head, or a difference of £2,113,000. Of this £1,090,000 belongs to Sardinia alone, consisting of £259,000 worth of cotton manufactures, £190,000 of woollen manufactures, £118,000 of linen manufactures, £124,000 of iron, wrought and unwrought (in the whole of which branches of trade the transactions have considerably more than doubled), and £267,000 of miscellaneous articles. Our trade in foreign and colonial produce has been likewise considerably enlarged. The exports of coffee have increased more than nine fold, being 197,000 lbs. in 1850 against £1,902,000 lbs. in 1860. The exports of cotton wool do not exhibit so large an increase, because of the greatly augmented direct trade with the American States; the shipments of tobacco exhibit a considerable falling off for the same reason. The exports of sugar during the past five years have also greatly diminished, the value of 1856 being £90,000, and in 1860 only £29,000. The imports from Sardinia have not greatly varied; in 1860 their real value was only about one-twentieth the amount of the exports thereto. The trade with Tuscany has advanced from £769,000 to £1,034,000, being an improvement of £265,000, of which £165,000 consisted of cotton manufactures, £38,000 of iron, and the remainder of other articles. The exports of foreign and colonial produce have not greatly varied, excepting in the case of coffee, the shipments of which have increased about five fold. Our business transactions with the Papal States have been almost stationary. During the last five years the trade has positively declined. The exports of do-

mestic produce in 1850 were valued at £222,000; in 1858 at £409,000; but in 1860 at only £294,000. Our imports have fallen from £185,000 in 1856, to only £40,00 in 1860. The total of our exports to the Two Sicilies exhibits an increase of £295,000, (£1,321,000 against £1,026,000), but if we take the year 1851 the increase is only £55,000. For the first five years of the decade the shipments fell from £1,026,000 to £563,000, but during the last five years a rapid improvement took place, and in 1860 the figures were £1,321,000. More than one-half of our exports consist of cotton manufactures (£729,000); the next largest item is iron, £136,000; then follow woollens, linen, coal, and copper. During the ten years there was a considerable increase in the shipments of machinery, *i.e.*, from £6,400 to £42,300.

Our direct trade with Austria is, in proportion to the population of the empire, the smallest of any in Europe, being only £993,000, or 6¾d. per capita, in 1860, against £608,000, or 4¾d. per capita, in 1850. A large quantity of English manufactures, however, find their way into Austria through the northern frontiers, *via* the various German ports. In 1855 the total value of the imports from all quarters into the Austrian Empire was £23,646,000, of which only £4,890,000 arrived by sea, the remainder, or £18,756,000, being received by land, out of which £11,221,000 consisted of imports from Prussia, Saxony, and Southern Germany, and in which item no doubt a considerable quantity of British manufactures would be included. It is a curious fact that from 1850 to 1855 the sea imports of Austria declined from £6,123,000 to £4,890,000, whilst the land trade rose from £9,771,000 to £18,756,000. Our exports to Trieste, &c., have exhibited great fluctuations. In 1850 they amounted to £608,000; in 1851 to £813,000; but in 1854 to only £636,000; in 1858 the shipments advanced again to £1,298,000, and in 1860 receded to £993,000; the effects of the war of 1859 were demonstrated by an export of only £790,000. The fluctuations were chiefly in the textile manufactures; one cause of the large figures of 1858 was a greatly augmented demand for iron, the exports of which in that year were valued at £304,000, against only £44,000 in 1850, and £112,000 in 1856. In 1850 Austria took £55,000 worth of machinery, in 1857 £173,000 worth, but in 1860 only £63,000 worth. Excepting in the matter of raw cotton our colonial export trade with Trieste and other Austrian ports shows little change, but the shipments of cotton have risen from 30,000 cwts. in 1850 to 318,000 in 1860.

Our commerce with Greece and the Ionian Islands has increased upwards of one hundred per cent., *i.e.*, from £338,000, or 5s. 7d. per head, to £689,000, or 10s. 3¾d. per head. The exports to Greece alone, however, have only improved about 70 per cent. The direct trade with that kingdom in 1860 was equal to about 6s. per capita. The shipments to the Ionian Islands have increased about 156 per cent., and in 1860 the consumption per head of population was nearly 26s. The articles principally effected by the increased trade have been the various textile manufactures.

The export business with European and Asiatic Turkey has advanced from £3,114,000, or 22¾d. per head, to £5,237,000, or 35¾d. per head, being an increase of £2,123,000, or 68 per cent. To Turkey Proper the increase in cotton manufactures and yarn alone was £1,574,000. Iron, coal, and copper show each a large increase; linens, since 1851, have shown a slight improvement; woollens have fallen off, as have also plate and jewellery; stationery has increased from £5,000 to £30,000 in value. The trade with Wallachia and Moldavia has declined from £295,000, or 16¾d. per head, to £173,000, or 8¾d. per head; the falling off was entirely in cotton manufactures and yarn. Iron and tin plates exhibit a slight increase. The shipments to Syria and Palestine were more than doubled during the decade—*viz.*, from £303,000 to £635,000. Of the £352,000 increase, £322,000 belonged to cottons, and nearly £20,000 to copper.

With the 21,000,000 of people in Persia and her neighbours, we did no direct trade in 1850, and only one to the extent of £32,000, or $\frac{3}{4}$ d. per head in 1860. But there is no doubt that some of our products find their way into that kingdom through both Turkey and India. Our transactions with Arabia, including Aden, averaged $\frac{3}{4}$ d. per head of its population in 1850, and 1d. in 1860. The Arabians, however, obtained a few articles indirectly from Syria, &c.

This brings us to India, the largest customer we have after the United States, as far as positive quantity is concerned, but still only a small one when we compare its consumption of British manufactures in relation to population with the various countries of Europe and America. It is in the East that our trade has the greatest room for expansion. Our exports to all parts of India and Ceylon in 1850 were worth £7,462,000, or $9\frac{3}{4}$ d. per head of population; in 1860 they amounted to £17,637,000, or $19\frac{1}{4}$ d. per head, an increase of £10,175,000, or over 136 per cent. There is every reason to believe that a similar or even greater increase will take place during the next ten years. If we suppose the improvement to be only 100 per cent., the amount in 1870 would only be 8s. $2\frac{3}{4}$ d. per head, or about equal to the per capita amount taken by Turkey in 1860. South America, in proportion to its population in 1860, took more than seven times the value of British productions exported to India in the same year; and the United States, notwithstanding their protective duties, over eight times the amount. Of the total increase of £10,175,000 to all India and Ceylon, £9,722,000 belonged to the British East Indies property so-called. Of this amount, £6,014,000 consisted of cotton manufactures and yarn; £1,667,000 of iron; £575,000 machinery; £439,000 beer and ale; and £375,000 copper. The exports to Ceylon rose from £218,000 to £671,000, or over 208 per cent. increase, composed chiefly of cotton, copper, and iron wares. The total shipments to Upper Asia, exclusive of Russia, averaged $9\frac{1}{2}$ d. per head in 1850, and 18 $\frac{1}{2}$ d. in 1860.

The trade with China (including Hong-Kong), though still very small when the vast extent of the population is taken into consideration, has more than trebled itself, the total exports in 1850 being £1,574,000, or about 1d. per head, and in 1860, £5,318,000, or $3\frac{1}{4}$ d. per head, estimating the population at the latter date to be 400,000,000. Of the increase of £3,744,000, £2,842,000 took place during the last two years of the decade. The exports in 1850 were valued at £1,574,000; in 1858 at £2,876,000; and in 1860 at £5,318,000. The war of 1859 has not been without its good results. The recent very favourable accounts as to the political prospects of the celestial empire, point to a brilliant commercial future for that extraordinary country. If our exports to China could be brought up even to the per capita rate of India, the sum total would be nearly £32,000,000, or more than the value of our entire shipments to the whole of Asia. If it could be brought to one-half the per capita average of our exports to the South American Continent, the amount would be over £115,000,000. More than two-thirds of the increased trade with China consisted of cotton manufactures, *i.e.*, from £1,021,000 to £3,570,000. Woollens advanced from £405,000 to £871,000, and lead and shot from £20,000 to £114,000.

To Birmah, Malaya, Siam, and Cochin China (chiefly through Singapore) our exports have risen from £562,000 to £1,684,000, or from $6\frac{3}{4}$ d. to $9\frac{1}{4}$ d. per head. The trade with the Indian Islands, except Java, has risen from £193,000 to £697,000, or from $\frac{3}{4}$ d. to 3d. per capita. To Java alone the exports have increased from £508,000 to £1,414,000, or from $10\frac{3}{4}$ d. to 2s. $4\frac{3}{4}$ d. per head. Taking the whole of Asia, our shipments have risen from £11,874,000 to £29,687,000, or from $4\frac{1}{2}$ d. to $9\frac{3}{4}$ d. per capita.

We come now to the isles and continent of Africa. Egypt, Nubia, and Abyssinia, purchased £650,000 worth of British productions in 1850, or $17\frac{3}{4}$ d. for each of their

9,000,000 of people. In 1860 they took £2,481,000, or 5s. $1\frac{1}{4}$ d. per head. One-half of the increase of £1,831,000 consisted of cotton and silk manufactures. The exports of plate, jewellery, and watches, rose from £30,000 to £170,000. Made-up apparel advanced from £55,000 to £223,000. During the second half of the period, the shipments of iron and copper fell off about one-half. The joint exports in 1850 were £25,000; in 1855, £313,000; and in 1860, £160,000 only. More than one-half of the imports from Egypt consists of raw silk in transit from India. This branch of trade has advanced from £905,000 in 1854, to £6,769,000 in 1860.

The business with Tripoli and Tunis has declined from £5,000 to £4,000, or from $\frac{1}{2}$ d. per head to $\frac{3}{4}$ d. per head. With Algeria our transactions have advanced from £15,000 to £44,000, or from $1\frac{3}{4}$ d. to $4\frac{1}{4}$ d. per capita. The trade with the empire of Morocco has increased more than five-fold, namely, from £32,000 to £171,000, or from $\frac{1}{2}$ d. to $2\frac{3}{4}$ d. per annum for each of its 15,000,000 of inhabitants. It is highly probable that the recent friendly financial assistance rendered to the Moorish empire, may tend to greatly extend our commercial intercourse with that country. There is no reason why our exports to Morocco should not be, at all events, equal to the shipments to Turkey; in that case, the amount, instead of being only £171,000, would be nearly £2,500,000. Three-fourths of our exports to Morocco consist of cotton goods and yarn. During the war with Spain the trade fell off about fifty per cent.

Estimating the islands and mainland of Western Africa to contain in 1850, two and a-half millions of people, their consumption of British manufactures, &c., in that year amounted to £778,000, or over 6s. 2d. per head; in 1860, the sum was £1,569,000, or nearly 11s. 5d. per head. The trade with the South Coast, the inhabitants of which are, with few exceptions, English settlers, grew from £797,000 to £2,064,000, or from £2 5s. $6\frac{3}{4}$ d. to £4 2s. $6\frac{3}{4}$ d. per head. To the East Coast and Islands, the exports were from £369,000 to £542,000, or from 1s. $6\frac{1}{2}$ d. to 2s. $1\frac{1}{2}$ d. per capita. Nearly the whole of these amounts consist of exports to the Mauritius, the population of which, in 1861, was ascertained to be about 307,000 souls. A considerable portion of the shipments to the West, South, and East Coasts, especially as regards the two former sections, find their way into the interior of the continent, where there are supposed to exist from 50 millions to 60 millions of people—some authorities say 80 millions to 100 millions, but I think the former estimate the more probable one. Taking the entire population of Africa at 90 millions in 1850, and 95 millions in 1860, and supposing the imports of English produce to have been equally distributed throughout the continent, the per capita rate of consumption, in the first-named year, was about 7d., and in the second about $17\frac{3}{4}$ d., an increase of over 140 per cent. in ten years.

We now cross the Atlantic to the New World. Beginning with British North America, we find our career of progress arrested, for though there has been a positive increase in our shipments to the Canadas of over £500,000, there has been a relative decrease of more than £300,000, for the per capita rate has fallen from £1 5s. $8\frac{3}{4}$ d., to £1 3s. 1d. This is partly accounted for by the extended trade with the United States, the value of whose exports of domestic produce to the North American Colonies advanced from about £1,330,000, in 1852, to about £3,930,000 in 1858, an increase of nearly 200 per cent. in six years, against an increase in the trade with the mother country of only $15\frac{1}{2}$ per cent in ten years—33 per cent. per annum against $1\frac{1}{2}$. Another retarding influence has been the high tariffs imposed upon all imports into the Colonies, duties ranging from 20 to 25 per cent. being laid upon most of our manufactures. Mr. Ashworth, Chairman of the Manchester Chamber of Commerce, in a letter to the Chairman of the Birmingham Chamber of Commerce, about a month ago, gave some figures, which I have no doubt

astonished the major part of the British public. The figures were as follow :—

DECLARED VALUE OF FIVE OF THE LEADING ARTICLES OF BRITISH MANUFACTURES EXPORTED TO CANADA IN 1856 AND 1860.

	1856. £	1860. £	Duty per cent.
Cotton manufactures	402,111	461,909	20
Iron, tin, cutlery, & hardware	640,853	469,322	20
Leather manufactures	15,275	8,734	25
Silk manufactures ...	44,966	42,399	20
Woollen manufactures	410,039	379,078	20
	1,513,244	1,361,442	—

Showing a decrease of £151,802 in four years. The total falling off of the exports of all kinds during the same period was £270,423. It seems that our onslaught on tariffs has been rather unevenly distributed lately. Cousin Jonathan is no doubt a great offender, but from the amount of talk we have had the last few months, one would suppose that he was the only fiscal culprit in the world. I am not now speaking exactly of the Morrill tariff, because that was passed by means of a species of political dodgery, and the great majority of the American people are fully aware that they have lost much more than they have gained by it, even in the matter of revenue, and there is no question but that when the country is once more blessed with peace, or perhaps before that time, the present import duties will be replaced by more moderate ones.

Whilst the tendency of our commerce with British North America has been a retrogressive one, the direction of our trade with the United States has been the reverse; for both positively and relatively there was a considerable increase between 1850 and 1860. The shipments in 1850 amounted to £14,892,000, or more than 2s. 11d. per head, and in 1860 they reached £21,018,000; or over 13s. 7d. per head, being an increase of £6,126,000, or over 41 per cent. as to the gross amount, and about 5 per cent. per head; of this increase £2,037,000 consist of cotton manufactures, which compose nearly one-fifth of the total exports; £1,186,090 of woollen manufactures, £856,000 of slops and haberdashery, £380,000 of salt, about £500,000 of soda, £370,000 of zinc plates, and the remainder of other articles. It is a deplorable fact that, from a combination of unfavourable circumstances, which it is unnecessary to recapitulate here, more than the whole of the increase represented by the comparative figures of the years 1850 to 1860, has been lost during the past year. The important question now is, what will be the future of our commercial relations with the American States?

I will begin with the so-called Southern Confederacy. Of the £21,018,000 worth of goods exported to the United States, about one-third, or £7,000,000 worth, found their way, directly or indirectly, into the slave states. Of this amount I estimate that the States which are likely to form the new republic, (*i.e.*, all the slave states, except Delaware, Maryland, Kentucky, and Missouri) took about £4,750,000. In addition to this, the same states took about £12,000,000 worth of the produce of other foreign countries, and about £18,000,000 worth of the manufactures of the Free States, making a total consumption of £34,750,000 worth of imported produce and manufactures, or about £5 6s. 8d. for each of the 5,581,000 freemen, and £1 10s. for each of the 3,220,000 slaves contained in the would-be confederacy. There are some people who are so inexperienced and so unacquainted with history and human nature, as to suppose that when the present civil war is over there will be such a gulf fixed between the Northern and Southern sections of the present union, that the commercial intercourse between the two, which has existed hitherto, will be almost entirely cut off, and they suppose that Great Britain will consequently have a monopoly of the Southern trade. I saw a statement a few weeks ago, in the City article of a London morning paper, to the effect that

our trade with the Southern States, when they have succeeded in working out their independence, would jump up the first year or two to £60,000,000 per annum; and I have frequently seen equally absurd statements in the columns of other and more influential journals. My own opinion is, that whatever may be the result of the existing conflict, the trade between the Northern and Southern States will always be larger than the trade between the South and any European nation. We may have a slight advantage for the first year or two, but it will be slight indeed, and only temporary. If we suppose the Southern Confederacy to commit such an unprecedented piece of folly as to prohibit all importation from the North, there would be £18,000,000 to £20,000,000 of custom thrown open to the world. Let us suppose that England will get the whole of it; our exports would then range between £22,500,000 and £25,000,000—something less than £60,000,000, I expect. The more likely result, however, will be that our exports, instead of the present rate of about £5,000,000, may run up to £15,000,000 in a short time. Our merchants may rest assured that they will not have a monopoly of the commerce with the Southern States, and that neither will the Southern States be able to afford to dispense with a tariff much under 20 to 25 per cent. *ad valorem*, either on imports or exports, or on both. They have no other means of raising a revenue. The slave-owners are, comparatively, a small body of men, and hold nearly all the rateable property of the country; they will, therefore, oppose every impost in the shape of a Federal direct tax; the present war operations are being carried on almost solely by means of paper-money, and gold is at a premium of 40 per cent., the Government trusting to their future import and export duties to pay off the interest and principal of their present and to come liabilities.

As to the Northern States, foolish as they have been, the probability is that they will always be as good if not much better customers than their Southern rivals. They took about £14,000,000 of the £21,000,000 exported to the entire Union in 1860, and we shall not be far astray if we look for a yearly gradual increase upon that amount.

But we must pass on to Mexico and California. The joint exports to this district in 1850 were £452,000, or 14½d. per head, and in 1860, £1,057,000, or 28½d. per head, being an increase of £605,000, which, with the exception of £11,000, belongs to California alone. Our trade with Mexico itself has undergone some wide fluctuations. Commencing with £452,000 in 1850, the exports rose to £792,000 in 1853, to £888,000 in 1856, and fell to £463,000 in 1860. The deplorable condition of the country has doubtless been the cause of all this, and we have only to hope that the present intervention of European powers will bring about a new and improved order of things. If our exports to Mexico could be brought up to a per capita equality with the neighbouring republic of New Granada, the sum total would be nearly two-and-a-half millions instead of only £463,000.

The trade with the British West India Islands has advanced from £1,706,000 to £1,845,000; but in relation to population there has been a decline from 40s. 4d. to 38s. 10d. The exports to Hayti have risen from £275,000 to £413,000, or from 5s. 6d. to 7s. 10½d. per capita. Those to the Foreign West India Islands have risen from £1,518,000 to £2,333,000, or from 17s. 7½d. to 23s. 1½d. The shipments to Central America (including British Honduras) have fallen from £434,000 to £325,000, or from 4s. 4½d. to 2s. 11½d. per head; but some portion of the exports to the Foreign West India Islands have been transhipped to the mainland, and on the whole an increase of £606,000 is shown. The trade with New Granada has increased from £331,000 to £810,000, or from 3s. 10½d. to 6s. 5d. per capita. That with Venezuela has advanced from £301,000 to £324,000, but in relation to population has declined from 4s. 5½d. to 4s. per head. The commerce with Ecuador has risen from £33,000 to £74,000, or from 10½d. to 19½d. per head. The per capita dis-

parity between Ecuador and Venezuela and New Granada arises from the fact that a large portion of the imports into the two latter are sent overland to the former one. British Guyana took £324,000 worth of British manufactures and produce in 1850, and £370,000 in 1860, or an increase from about £2 11s. to about £4 1s. 5d. per head. Foreign Guyana took £5,000 worth in 1850, and £25,000 worth in 1860, or 13½d. in the former and 5s. 2½d. in the latter year. Taking the whole of the West Indies and Central American States, the shipments in 1850 were valued at £4,927,000, and in 1860 at £6,619,000, or 9s. 8½d. against 11s. 5½d. per head.

We now come to the Brazilian Empire, our next best customer on the American Continent after the United States, and with which our trade has advanced from £2,545,000 to £4,444,000, or from over 7s. 3d. to more than 10s. 11d. per capita. Of the increase of £1,899,000, £814,000 belonged to cotton manufactures, £223,000 to iron, £67,000 to butter, £69,000 to coal, £65,000 to machinery, £58,000 to linen manufactures, £43,000 to beer and ale, £44,000 to hardwares and cutlery, and the remainder to other articles. It is a pleasing feature to notice in relation to our commercial intercourse with the Brazils, that whilst the general import trade of the empire from 1853 to 1857 increased only about 46 per cent., the imports from England exhibited an improvement of about 62 per cent.

Our business with Paraguay, Uruguay, La Plata, and Patagonia has increased nearly three hundred per cent., namely—from £909,000 to £2,705,000, or from 5s. 6d. to 14s. 9½d. per head; the increase consisting chiefly of the textile manufactures. The business with South East America (Chili, Peru, and Bolivia) has advanced from £2,002,000 to £3,086,000, or over one hundred per cent., being 8s. 0½d. per head in 1850, and 10s. 13d. in 1860. Taking the entire continent of America, the value of our exports has advanced from £28,974,000 in 1850 to £42,671,000 in 1860, or from 9s. 10½d. to 11s. 9½d. per capita.

The exports to Australia and the South Sea Islands have risen from £2,620,000 in 1850 to £9,741,000 in 1860, or from about £2 12s. 4d. per head to £4 17s. 5d. per head.

To recapitulate, our commerce with Europe has advanced from £25,252,000 to £46,868,000, or 33 per cent.; that with Asia from £11,874,000 to £29,687,000, or 150 per cent.; that with Africa from £2,626,000 to £6,875,000, or 159 per cent.; that with America from £28,974,000 to £42,671,000, or 47 per cent.; that with Australia from £2,620,000 to £9,741,000, or 271 per cent.; that with all foreign countries from £51,939,000 to £92,170,000, or 77 per cent.; that with British Colonies and Possessions from £19,428,000 to £43,672,000, or 124 per cent.; and that with the world from £71,367,000 to £135,842,000, or 90 per cent.

So much time has been taken up with the first table that the remainder cannot be more than glanced at; however, I have endeavoured to make them as self-explanatory as possible, and with that object the figures are arranged in such a form as to enable each table to tell its own story; but I will just draw attention to a few of their most striking features.

The cotton manufactures and yarns make up the largest items of export, being £28,257,000 for 1850, and £51,959,000 for 1860—an increase of £23,702,000, or nearly 84 per cent. The great bulk of the improvement however has been in goods entered by the yard, which exhibit an increase of close upon 100 per cent., whilst the increase of hosiery, lace, &c., is only 29 per cent., and that in yarns only 54 per cent. Goods (including hosiery, &c.) formed 77 per cent. of the whole in 1850, but 81 per cent. in 1860. The large proportional increase in the exports of cotton manufactures and yarns is shown by the fact that, whilst, in 1850, the figures represented about 35 per cent. of the total national exports of all articles, in 1860 they represented 38 per cent.

The shipments of linen manufactures and yarns have increased from £4,828,000 to £6,606,000, or over 36 per cent. The chief part of the increase has been in yarn, the exports of which have advanced over 104 per cent. The shipments of tape, thread, &c., have remained almost stationary, whilst the figures relating to goods show an increase of only a little over 23 per cent.

The exports of silk manufactures have risen from £1,256,000 to £2,413,000, an improvement of over 92 per cent.

Woollen manufactures and yarn, which in 1850 represented over 15 per cent. of our total exports, but only about 12 per cent. in 1860, show an increase of £5,959,000, or £16,000,000 against £10,041,000. As in linen, the comparative increase in yarn has been much greater than that in goods, &c. The joint shipments of goods entered by the piece and by the yard have improved rather over 39 per cent., but the exports of hosiery and small wares have been rather more than doubled, and those of yarn show an increase of over 163 per cent.

The exports of apparel and slops, in 1850, were valued at £910,000; in 1860 at £2,156,000; and those of haberdashery, &c., at £1,470,000 and £4,005,000 respectively, or a joint increase of nearly 160 per cent.

The total shipments of all kinds of textile manufactures advanced from £46,762,000 in 1850, to £83,139,000 in 1860, an improvement of almost 78 per cent.

The increase in the extent of the metal trades, especially iron, has been very extraordinary. Beginning with the manufactures—copper has improved more than 50 per cent., and guns much the same. Hardware and cutlery have advanced about 42 per cent. Iron more than 156 per cent. The exports of steam-engines have risen from £424,000 to £1,238,000, nearly threefold; those of other kinds of machinery from £618,000 to £2,600,000, more than fourfold. Tin manufactures exhibit an increase of about 60 per cent. The value of the total exports of metal manufactures in 1860 was nearly double that of 1850, being £15,343,000 against £7,679,000. The comparative increase in the exports of unwrought metals was even greater, being £13,899,000 against £6,579,000. Iron alone rose from £3,845,000 to £8,292,000. Coal, from £1,315,000 to £3,316,000. The shipments of tin were almost trebled. Salt rose from £21,000 to £120,000. Copper, from £662,000 to £750,000. The total shipments of mining produce, wrought and unwrought, in 1850, were valued at £14,258,000 in 1850, and £29,242,000 in 1860, being an improvement of 111 per cent.

The exports of miscellaneous manufactures have increased from £6,838,000 in 1850 to £14,715,000 in 1860. It would be tedious to go through the separate items, and I shall therefore content myself by referring you to the figures in Table 4.

The shipments of animals and animal produce have more than doubled, *i.e.*, from £1,541,000 to £3,178,000. Butter exhibits the most important increase. The corn, flour, and provision exports are small, but still have increased almost sixfold during the decade.

We will now glance rapidly at the facts contained in Table 2, relating to the import trade. In this relation I will refer only to the *official* values, as the *real* value of the imports of 1850 is not known. For all practical purposes, the official values will answer the purpose we have in view, *viz.*, the progress made between 1850 and 1860. The computed real value of the imports was made for the first time in 1854. The figures for 1860 are given in Table 2, and will be found useful, and, when compared with the official values of the same year, very suggestive. As is well known, the official figures are more an idea of quantity than of value.

The imports of cotton wool rose from £21,531,000 to £44,615,000, more than twofold. The increase from the United States was 126 per cent.; from India 71 per cent.; and that from other countries only 11 per cent., as will be seen from the following figures:—

IMPORT OF COTTON WOOL INTO GREAT BRITAIN.

	1850.	1860.	Increase per cent.
	lbs.	lbs.	
United States ...	493,153,000 ...	1,115,891,000 ...	126
East Indies	118,873,000 ...	204,141,000 ...	71
Other countries..	61,551,000 ...	70,907,000 ...	11
Total...	663,577,000 ...	1,390,939,000 ...	109

The small proportionate increase from India and other countries, demonstrates the superior favour with which the produce of the Southern American States is held by our spinners, and there can be no doubt that at the close of the present unfortunate war, the same supremacy will be reattained by the American fibre. It seems now to be conceded that Indian cotton cannot compete with the much firmer, longer, and more wiry staple of American. The reasons are, that spinners can get through a greater quantity of work in a given time when producing yarn from American than when producing it from Surat; that weavers can make more money in a given time when weaving yarn from American cotton than when weaving it from Surat, and that both yarn and cloth produced from the American fibre will be more readily sold and bring a higher relative price than when produced from Surat yarns. Surat can supply the place of American when the latter is absent, but will never be able to compete with it when present. A vast improvement has been made in Indian cotton during the past ten years, and the fibre can now compete to some extent with the upland growths of the Southern States, but it is as far off New Orleans staple (which comprises more than half the American crop), as New Orleans is from Sea Island. During the potatoe blight in Ireland French beans filled up the gap to some extent, but French beans have no chance when potatoe are plentiful.

The imports of flax show a considerable decrease; the quantity received in 1850 was 1,823,000 cwts., but in 1860 only 1,463,000 cwts. The receipts of hemp have advanced nearly fifty per cent., and if we add the import of jute from India, the increase is over one hundred per cent. The arrivals of silk have improved over eighty per cent., and those of wool more than one hundred per cent.

The total imports of all kinds of textile raw materials, show an increase of nearly 90 per cent.

The imports of minerals of all kinds exhibit an increase of £2,935,000, of which £892,000 belongs to copper, £522,000 to quicksilver, and £241,000 to zinc.

The arrivals of dyeing and colouring materials in 1850 were officially valued at £6,206,000, and, in 1860, at £7,697,000—an increase of £1,491,000, of which £1,002,000 consisted of madder, and £277,000 of dye woods.

The receipts of various kinds of animal produce exhibit an advance of £1,292,000, of which £858,000 consisted of hides, £203,000 of tallow, £167,000 of bones, and £106,000 of skins and furs.

Under the head Various, we find that our imports of oil have advanced from £2,336,000 to £3,113,000. Hard woods show a decline, but those of other kinds of timber a large increase. Rosin has doubled itself, but turpentine has fallen off more than fifty per cent.

The total imports of all raw materials used in the arts and manufactures, according to the official values, increased £34,608,000, or nearly 70 per cent. The official value, in 1860, was £84,298,000, but the real value £106,290,000—a difference of over 20 per cent.

The additional arrivals of live stock amounted to about 27 per cent. and consisted chiefly of oxen and bulls from Denmark, and oxen, bulls, cows, and calves from Holland.

The total imports of provisions rose from £2,569,000 in 1850 to £4,015,000 in 1860. The real value in the latter year was £8,949,000. The principal increase was in butter from Holland; in cheese from Holland and the United

States, and in fish from British North America and Norway.

The imports of all kinds of wheat and flour advanced from £12,289,000 to £19,090,000. The arrivals of potatoes fell from £668,000 to £279,000.

The receipts of cocoa were more than doubled. Those of coffee rose from £3,172,000 to £5,168,000; those of tea from £5,051,000 to £8,895,000; those of sugar from £10,407,000 to £13,478,000. The imports of food, chiefly tropical, were valued at £21,257,000 in 1850, and £34,038,000 in 1860.

The purchases of tobacco increased more than 59 per cent.

Our consumption of foreign manufactures is very small. The imports of all kinds of textile fabrics were officially valued at £4,158,000 in 1850, and £6,493,000 in 1860; nearly one-half of both amounts consisted of silk manufactures, a good portion of which were re-exported.

The imports of miscellaneous manufactures, in 1850, were placed as worth £2,945,000, of which almost one-third consisted of wine, and in 1860 at £5,421,000, of which about one-fourth was wine. The arrivals of glass manufactures rose from £223,000 to £831,000; those of clocks and watches from £174,000 to £565,000; those of musical instruments, from £55,000 to £170,000; and those of oil seed-cake from £295,000 to £601,000.

The real value of our entire imports, in 1860, was £210,531,000, of which £106,290,000, or more than one-half, consisted of raw materials; £67,899,000 of various kinds of food and provisions; £11,433,000 of other kinds of agricultural produce; £6,893,000 of textile manufactures; £10,353,000 of various other kinds of manufactures, and £7,663,000 of unenumerated articles.

We now come to the figures relating to the carrying trade of the kingdom. Table No. 3 will be found to supply a variety of interesting particulars in this relation. In 1850, 14,504,000 tons of shipping were entered into and cleared out of the ports of Great Britain and Ireland, of which 9,442,000 tons, or 65 per cent., were British, and 5,062,000 tons, or 35 per cent., were foreign vessels. Ten years later the proportion of British had fallen to 56½ per cent., whilst that of foreign had risen to 43½ per cent. of the whole. During the decade there was an increase in the total of about 70 per cent., but whilst the increase in British shipping was only 47 per cent., that in foreign vessels was 112 per cent. The large comparative increase in the arrivals of foreign shipping is due, to some extent, to the repeal of the navigation laws which took place in 1850, and which gave a great stimulus to ship building in America and North Europe, but without which our commerce would have been much cramped, if not positively retarded.

Our immense trade requires the aid of all the shipping we can obtain. But, notwithstanding the extraordinary development which has taken place in shipbuilding abroad, our own carpenters turned out 2,031,000 tons of vessels in the similar period ending in 1860, against only 1,495,000 tons during the ten years ending in 1850. So long as we give such perfect freedom of trade to the shipping of foreign countries, it is but right that we should get a like treatment abroad. Our shipowners have long justly complained of the adverse legislation of various foreign nations respecting international navigation, but the growing favour of the doctrines of free trade point to a time, not far distant, when something like an approach to reciprocity will be made.

Such is an imperfect sketch of the progress of British commerce during the past ten years—imperfect, partly because of the impossibility of going fully into the matter in a single evening, but chiefly because of my inability to thoroughly handle the host of topics suggested by the title of this paper. I will not further tire you with any attempt at a peroration, for I am sure that many gentlemen present can occupy your time much better than I can.

Table No. 1.—(Continued.)

AFRICA.		9,000,000	9,675,000	650,000	17½	2,481,000	61½	1,831,000	—	116,000	114,000	119,000	1,841,000	3,356,000	10,351,000
Egypt, Nubia, and Abyssinia (Med. and Red Sea Ports) ...		2,500,000	2,700,000	5,000	4,000	—	—	—	1,000	—	—	1,000	—	2,000	14,000
Tripoli and Tunis ...		2,200,000	2,365,000	15,000	1½	44,000	4½	29,000	—	62,000	18,000	43,000	7,000	69,000	2,000
Algeria ...		15,000,000	15,750,000	32,000	—	171,000	2½	139,000	—	316,000	286,000	274,000	743,000	2,086,000	2,141,000
West Coast and Islands, inclusive of Madag. and the Canaries ...		2,500,000	2,750,000	778,000	74½	1,569,000	136½	1,788,000	—	64,000	63,000	97,000	301,000	691,000	1,713,000
South Coast ...		350,000	500,000	797,000	546½	2,064,000	99½	1,267,000	—	28,000	18,000	27,000	1,395,000	1,882,000	1,707,000
East Coast and Islands, inclusive of Madagascar and Mauritius ...		4,750,000	5,100,000	369,000	18½	542,000	25½	173,000	—	586,000	499,000	561,000	4,382,000	8,098,000	16,210,000
Interior of Continent ...		53,700,000	56,160,000	—	—	—	—	—	—	—	—	—	—	—	—
TOTAL FOR AFRICA ...		90,000,000	95,000,000	2,646,000	7	6,875,000	17½	—	—	—	—	—	—	—	—
AMERICA.		50,000	55,000	11,000	52½	—	—	—	11,000	5,000	—	—	57,000	93,000	145,000
Greenland and Russian N. America		2,517,000	3,237,000	3,235,000	308½	3737,000	277	502,000	—	589,000	301,000	259,000	1,553,000	7,192,000	6,820,000
British North America		23,013,000	30,869,000	14,892,000	155½	21,018,000	103½	6,126,000	—	1,686,000	923,000	1,210,000	20,668,000	29,796,000	44,721,000
United States, Atlantic Ports		7,664,000	8,739,000	462,000	14½	1,057,000	28½	605,000	—	210,000	33,000	107,000	638,000	221,000	494,000
Mexico and U.S. Pacific Ports		845,000	950,000	1,706,000	484½	1,845,000	46½	139,000	—	289,000	167,000	176,000	4,103,000	3,977,000	4,400,000
{ British West India Islands ...		1,000,000	1,200,000	275,000	66	413,000	82½	138,000	—	9,000	4,000	4,000	299,000	117,000	123,000
{ Hayti ...		1,720,000	1,930,000	1,518,000	211½	2,233,000	277½	715,000	—	79,000	48,000	109,000	1,506,000	3,478,000	3,364,000
{ Foreign West India Islands ...		2,000,000	2,200,000	434,000	52½	325,000	35½	—	109,000	39,000	16,000	25,000	1,848,000	708,000	534,000
{ Central America, inclusive of British Honduras... New Granada ...		2,300,000	2,525,000	331,000	34½	816,000	77	479,000	—	66,000	14,000	44,000	1,03,000	376,000	556,000
{ Venezuela ...		1,350,000	1,620,000	301,000	53½	324,000	48	—	—	6,000	6,000	4,000	51,000	42,000	25,000
{ Ecuador ...		750,000	900,000	33,000	10½	74,000	19½	41,000	—	6,000	2,000	2,000	1,000	29,000	107,000
{ Guyana, British ...		127,000	140,000	324,000	612½	570,000	97½	246,000	—	50,000	32,000	46,000	967,000	1,636,000	1,595,000
{ " Foreign ...		87,000	96,000	5,400	13½	25,000	62½	20,000	—	—	1,000	1,000	9,000	43,000	91,000
TOTAL FOR LAST NINE DISTRICTS ...		10,179,000	11,561,000	4,927,000	116½	6,619,000	137½	1,692,000	—	544,000	290,000	411,000	8,887,000	10,306,000	10,794,000
{ Brazil ...		7,000,000	8,100,000	2,545,000	87½	4,444,000	131½	1,899,000	—	57,000	122,000	125,000	2,359,000	2,084,000	2,269,000
{ Paragua, Uruguay, La Plata, &c. ...		3,305,000	3,650,000	909,000	66	2,705,000	177½	1,796,000	—	27,000	42,000	60,000	1,053,000	1,674,000	1,978,000
{ Chili, Peru, and Bolivia ...		4,975,000	6,100,000	2,002,000	96½	3,986,000	121½	1,084,000	—	167,000	69,000	83,000	2,057,000	4,540,000	5,363,000
{ Falkland Islands ...		10,000	12,000	1,000	24	5,000	100	—	4,000	—	2,000	1,000	—	6,000	7,000
TOTAL FOR AMERICA ...		58,713,000	72,343,000	28,974,000	118½	42,671,000	141½	13,697,000	—	3,265,000	1,782,000	2,256,000	37,261,000	55,912,000	72,597,000
AUSTRALIAN AND SOUTH SEA ISLANDS ...		1,000,000	2,000,000	2,620,000	628½	9,741,000	1169	7,121,000	—	376,000	1,478,000	893,000	1,472,000	4,329,000	6,471,000
TOTAL FOR THE WORLD ...		1,094,176,000	1,196,247,000	71,367,000	15½	135,842,000	27½	64,475,000	—	21,874,000	18,649,000	28,630,000	100,469,000	152,592,000	210,531,000
RECAPITULATION.		248,473,000	268,774,000	25,252,000	24½	46,808,000	41½	21,615,000	—	16,532,000	14,112,000	23,856,000	35,601,000	59,993	84,479,000
{ Europe ...		695,725,000	758,130,000	11,874,000	4½	29,687,000	9½	17,813,000	—	1,013,000	778,000	1,064,000	21,753,000	24,260	30,774,000
{ Asia ...		90,000,000	95,000,000	2,646,000	7	6,895,000	17½	4,229,000	—	584,000	499,000	561,000	4,382,000	8,098	16,210,000
{ Africa ...		58,713,000	72,343,000	28,974,000	118½	42,671,000	141½	13,697,000	—	3,265,000	1,782,000	2,256,000	37,261,000	55,912	72,597,000
{ America... Australia, &c. ...		1,000,000	2,000,000	2,620,000	628½	9,741,000	1169	7,121,000	—	376,000	1,478,000	893,000	1,472,000	4,329	6,471,000
TOTAL ...		1,094,176,000	1,196,247,000	71,367,000	15½	135,842,000	27½	64,475,000	—	21,874,000	18,649,000	28,630,000	100,469,000	152,592	210,531,000
{ Foreign Countries ...		952,261,000	1,032,147,000	51,939,000	13	92,170,000	21½	40,231,000	—	19,231,000	15,647,000	26,762,000	74,584,000	118,440	167,571,000
{ British Possessions ...		141,915,000	164,100,000	19,428,000	32½	43,672,000	63½	24,244,000	—	2,643,000	3,002,000	2,868,000	28,885,000	34,152	42,960,000
TOTAL ...		1,094,176,000	1,196,247,000	71,367,000	15½	135,842,000	27½	64,475,000	—	21,874,000	18,649,000	28,630,000	100,469,000	152,592	210,531,000

TABLE No. 2.—IMPORTS AND EXPORTS OF FOREIGN AND COLONIAL PRODUCE, &c.
 VALUE OF FOREIGN AND COLONIAL PRODUCE AND MANUFACTURES, IMPORTED INTO AND EXPORTED FROM GREAT
 BRITAIN AND IRELAND, IN THE YEARS 1850 AND 1860.

ARTICLES.	OFFICIAL VALUE.				REAL VALUE.	
	1850.		1860.		1860.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
RAW MATERIALS USED IN ARTS AND MANUFACTURES.						
TEXTILE—						
Cotton	21,531,000	6,539,000	44,615,000	15,981,000	35,757,000	5,388,000
Flax	3,776,000	94,000	3,088,000	34,000	3,837,000	35,000
Hemp	960,000	22,000	1,472,000	130,000	1,204,000	93,000
Hair—Goats	53,000	—	†	†	425,000	8,000
„Horses	54,000	—	74,000	3,000*	119,000	4,000
Jute	—	—	†	†	661,000	29,000
Silk (including Thrown)	2,914,000	555,000	5,285,000	3,161,000	10,578,000	4,107,000
Wool	1,953,000	989,000	3,969,000	2,116,000	11,031,000	2,288,000
Total of Textile	31,241,000	8,199,000	58,503,000	21,125,000	63,612,000	11,952,000
MINERALOGICAL—						
Boracic acid	35,000	—	†	†	77,000	8,000
Borax	249,000	—	268,000	44,000*	30,000	5,000
Brimstone	345,000	39,000	519,000	7,000*	496,000	7,000
Copper	707,000	114,000	1,599,000	500,000	3,483,000	355,000
Iron	333,000	78,000	527,000	99,000	660,000	93,000
Lead	178,000	48,000	332,000	—	468,000	13,000
Nitre, cubic	189,000	109,000	326,000*	32,000*	502,000	47,000
Potash, &c.	236,000	16,000	181,000	4,000	201,000	4,000
Quicksilver	71,000	304,000	593,000	709,000	272,000	217,000
Saltpetre	190,000	131,000	400,000*	319,000	664,000	58,000
Silver ore	—	—	383,000	8,000*	383,000	8,000
Soda	38,000	—	14,000	—	11,000	—
Spelter or Zinc... ..	931,000	171,000	1,172,000	41,000	500,000	88,000
Tin ore	168,000	25,000	291,000	66,000	431,000	68,000
Total of Mineralogical	3,670,000	1,035,000	6,605,000	1,999,000	8,178,000	971,000
DYEING AND COLOURING MATERIALS—						
Annato	30,000	10,000	42,000	25,000†	12,000	7,000
Argol	29,000	—	†	†	120,000	21,000
Bark	88,000	—	94,000	20,000*	164,000	35,000
Cochineal	2,012,000	1,242,000	2,038,000	2,114,000	410,000	304,000
Cutch, &c.	121,000	28,000	247,000	44,000*	220,000	40,000
Dyewoods	707,000	121,000	984,000	53,000	560,000	41,000
Gum	314,000	105,000	282,000	58,000	348,000	77,000
Indigo	1,048,000	1,162,000	1,223,000	1,275,000	2,529,000	1,942,000
Madder root, &c.	1,597,000	13,000	2,599,000	104,000*	938,000	33,000
Safflower	100,000	—	80,000	45,000*	82,000	45,000
Shumac	85,000	—	91,000	5,000*	168,000	10,000
Valonia	75,000	—	116,000	—	272,000	1,000
Total of Dyeing and Colouring materials.	6,206,000	2,681,000	7,697,000	3,743,000	5,823,000	2,556,000
ANIMAL PRODUCE (not enumerated)—						
Bones	129,000	—	296,000	—	307,000	—
Bristles	43,000	—	48,000	3,000	351,000	25,000
Grease	—	—	†	†	17,000	1,000
Hides	1,833,000	401,000	2,691,000	897,000	3,314,000	954,000
Horns	20,000	—	†	†	131,000	4,000
Isinglass... ..	24,000	—	31,000	2,000*	85,000	5,000
Skins and Furs... ..	354,000	84,000	460,000	209,000	1,412,000	526,000
Sponge	—	—	†	†	286,000	48,000
Tallow	1,329,000	49,000	1,532,000	15,000	4,014,000	26,000
Teeth	58,000	24,000	63,000	20,000*	332,000	105,000
Wax, Bees'	51,000	32,000	55,000	33,000*	100,000	61,000
Whalefins	76,000	—	33,000	9,000*	82,000	22,000
Total of Animal Produce	3,917,000	590,000	5,209,000	1,188,000	10,431,000	1,813,000
VARIOUS—						
Caoutchouc	21,000	3,000	149,000	36,000	471,000	141,000
Cork	74,000	—	110,000	15,000*	158,000	22,000
Gutta Percha	17,000	—	†	†	161,000	6,000
Oil	2,336,000	372,000	3,113,000	590,000	5,453,000	1,028,000
Pitch and Tar	126,000	—	141,000	8,000*	212,000	12,000
Rags (for paper-making)	48,000	—	99,000	—	323,000	—
Rosin	119,000	—	250,000	16,000*	182,000	10,000
Turpentine	218,000	—	93,000	—	86,000	—
Timber	1,265,000	5,000	1,924,000	38,000*	10,570,000	141,000
Do. Hardwoods only	432,000	17,000	396,000	16,000*	630,000	26,000
Total of Various	4,656,000	397,000	6,284,000	719,000	18,246,000	1,386,000
Total of Raw Materials	49,690,000	12,902,000	84,928,000	29,074,000	106,290,000	18,678,000

* Estimated.

† Not enumerated.

TABLE No. 2, CONTINUED.

AGRICULTURAL PRODUCE (not already enumerated).

ANIMALS—Live Stock—

Horses	38,000	—	—	—	53,000	—
Oxen, Cows, &c.	99,000	—	161,000	—	1,533,000	—
Sheep and Lambs	32,000	—	71,000	—	554,000	—

Total of Live Stock

169,000 — 232,000 — 2,140,000 —

Provisions—

Bacon and Hams	791,000	7,000	734,000	2,000*	960,000	2,000
Beef	125,000	—	241,000	17,000*	418,000	28,000
Butter	481,000	—	1,233,000	1,000*	4,078,000	10,000
Cheese	530,000	7,000	858,000	10,000*	1,598,000	22,000
Eggs	33,000	—	†	—	479,000	—
Fish	75,000	—	486,000	14,000*	360,000	11,000
Lard	334,000	—	299,000	—	587,000	1,000
Pork	200,000	—	164,000	—	406,000	—
Poultry, Game, &c.	—	—	†	—	63,000	—

Total of Provisions

2,569,000 14,000 4,015,000 44,000 8,949,000 74,000

Food—Common—

Wheat	6,307,000	9,000	—	—	16,554,000	14,000
Other kinds of Corn and Grain	4,083,000	22,000	—	—	10,754,000	5,000
Wheat-meal and Flour	1,895,000	13,000	—	—	4,321,000	7,000
Other kinds of Meal and Flour	4,000	—	—	—	43,000	—
Potatoes	668,000	—	279,000	—	137,000	—

Total of Common

12,957,000 44,000 19,377,000 17,000 31,809,000 26,000

Chiefly Tropical—

Cocoa	112,000	52,000	229,000	87,000	287,000	73,000
Coffee	3,172,000	761,000	5,168,000	2,852,000	2,543,000	1,440,000
Fruit	880,000	72,000	1,344,000	301,000	2,361,000	281,000
Hops	24,000	—	258,000	—	569,000	16,000
Rice	663,000	248,000	1,143,000	1,172,000	1,027,000	787,000
Sago	195,000	19,000	252,000	25,000*	150,000	14,000
Spices	753,000	660,000	971,000	1,095,000	473,000	313,000
Sugar	10,407,000	1,182,000	13,478,000	803,000	12,819,000	459,000
Tea	5,051,000	752,000	8,895,000	1,258,000	6,912,000	655,000

Total of Tropical

21,257,000 3,746,000 31,738,000 7,593,000 27,141,000 4,038,000

Total of Provisions, Food and Tropical ...

36,783,000 3,804,000 55,130,000 7,654,000 67,899,000 6,138,000

Chiefly Medicinal—

Bark, Peruvian	143,000	82,000	123,000	204,000	157,000	209,000
Cream of Tartar	114,000	—	78,000	—	200,000	—
Liquorice Root, &c.	50,000	—	148,000	53,000*	99,000	37,000
Rhubarb	100,000	50,000	144,000	133,000	35,000	32,000
Opium	—	—	†	†	196,000	91,000
Tobacco	331,000	136,000	528,000	90,000*	1,495,000	245,000

Total

743,000 268,000 1,026,000 480,000 2,182,000 614,000

VARIOUS:—

Guano	1,169,000	226,000	1,414,000	205,000	1,558,000	225,000
Seeds	229,000	29,000	1,781,000	276,000	5,553,000	783,000

Total of Agricultural Produce

39,093,000 4,327,000 59,583,000 8,615,000 79,332,000 5,760,000

MANUFACTURES.

TEXTILE:—

Cotton Goods	499,000	227,000	784,000	191,000	759,000	139,000
„ Yarn	34,000	44,000	—	—	113,000	97,000
• Embroidery	136,000	61,000	144,000	6,000*	94,000	4,000
Hair and Goat's Wool	160,000	136,000	491,000	233,000	491,000	233,000
Lace	81,000	—	10,000	—	57,000	2,000
Linen	57,000	15,000	93,000	8,000	105,000	8,000
Oil Cloth	—	—	†	†	15,000	1,000
Silk	2,430,000	1,253,000	3,119,000	271,000	3,344,000	224,000
Woollen Goods	682,000	127,000	1,384,500	26,000	1,442,000	26,000
„ Yarn	79,000	—	468,000	2,000*	473,000	2,000

Total of Textile

4,158,000 1,863,000 6,493,000 737,000 6,893,000 736,000

VARIOUS:—

Beads and Bugles of Glass	43,000	—	†	†	187,000	85,000
Books	32,000	—	53,000	3,000*	91,000	5,000
Caoutchouc	—	—	208,000	24,000*	75,000	8,000
Clocks and Watches	174,000	—	565,000	11,000*	566,000	11,000
Coir Ropes, &c.	50,000	—	136,000	4,000*	155,000	4,000
Flowers, Artificial	—	—	†	†	116,000	1,000
Glass of all kinds	223,000	86,000	831,000	100,000	243,000	29,000
Hats and Bonnets of Straw	1,000	—	†	†	100,000	93,000
Leather Boots and Shoes	100,000	—	123,000	16,000*	148,000	19,000
„ Gloves	82,000	—	133,000	7,000*	576,000	25,400
Musical Instruments	55,000	—	170,000	—	180,000	—
Oil Seed Cake	295,000	—	601,000	1,000*	911,000	2,000
Pictures	—	—	†	†	77,000	2,000
Plating of all kinds	18,000	—	†	†	194,000	3,000
Spirits	810,000	795,000	991,000	1,361,000	2,066,000	654,000
Tobacco, Manufactured	24,000	29,000	†	†	283,000	154,000
Wine	1,038,000	349,000	1,410,000	417,000	4,201,000	761,000
Yeast	—	—	—	—	184,000	—

Total of Various

2,945,000 1,229,000 5,221,000 1,944,000 10,353,000 1,856,000

Total of Manufactures

7,103,000 3,092,000 11,714,000 2,721,000 17,246,000 2,590,000

UNENUMERATED ARTICLES

4,583,000 1,535,000 9,141,000 2,375,000 7,663,000 1,600,000

TOTAL OF ALL KINDS

100,469,000 21,874,000 164,736,000 43,538,000 210,531,000 28,630,000

* Estimated.

† Not enumerated.

TABLE No. 3.—GENERAL SHIPPING.

TONNAGE OF VESSELS ENTERED AND CLEARED, IN THE PORTS OF THE UNITED KINGDOM, DISTINGUISHING THE FOREIGN FROM THE BRITISH, IN THE YEARS 1850 AND 1860.

GEOGRAPHICAL DIVISIONS.	1850.				1860.			
	ENTERED.		CLEARED.		ENTERED.		CLEARED.	
	British.	Foreign.	Total.	Tons.	British.	Foreign.	Total.	Tons.
Europe	2,511,000	1,675,000	4,186,000	4,339,000	3,920,000	3,608,000	7,528,000	7,440,000
Asia	342,000	9,000	351,000	34,000	604,000	65,000	669,000	1,033,000
Africa	185,000	32,000	217,000	183,000	288,000	44,000	332,000	365,000
America	1,600,000	684,000	2,284,000	2,339,000	1,955,000	1,561,000	3,516,000	3,348,000
Australia, &c.	62,000	..	62,000	148,000	122,000	5,000	127,000	321,000
Total	4,700,000	2,400,000	7,100,000	7,404,000	6,890,000	5,283,000	12,173,000	12,516,000
Total of entered and cleared ...	..	..	..	14,504,000	..	..	..	24,689,000
Per cent. of whole .....	..	..	..	100	..	..	..	100
Increase per cent. ....	..	..	..	..	..	..	..	70

TABLE No. 4.			
EXPORTS OF DOMESTIC PRODUCE, &c.			
The declared value of the principal and other Articles of British and Irish Produce and Manufactures exported from the United Kingdom during the years 1850 and 1860.			
	1850.	1860.	
MANUFACTURES.	£	£	
TEXTILE—			
Cotton: Goods	20,530,000	40,346,000	
Ditto, Hosiery, Lace, &c.	1,343,000	1,742,000	
Yarn	6,384,000	9,871,000	
Total of cotton	28,257,000	51,959,000	
Linen: Goods	3,589,000	4,435,000	
Ditto Tape, thread, &c.	358,000	370,000	
Yarn	881,000	1,801,000	
Total of linen	4,828,000	6,606,000	
Silk: Goods	1,256,000	{ 1,587,000	{ 826,000
Yarn (including thrown)			
Woollen: Goods (entered by the piece)	5,381,000	7,097,000	
Ditto by the yard	2,883,000	4,402,000	
Ditto Hosiery, &c.	325,000	657,000	
Yarn	1,452,000	3,844,000	
Total of woollen	10,041,000	16,000,000	
Various made up: Apparel and slops ...	910,000	2,156,000	
Haberdashery, &c.	1,470,000	4,005,000	
<i>Total of Textile Manufactures</i>	46,762,000	83,139,000	
METALLIC—			
Brass and copper	1,316,000	2,038,000	
Guns	231,000	333,000	
Hardware and cutlery	2,641,000	3,771,000	
Iron	1,505,000	3,862,000	
Machinery: steam engines	424,000	1,238,000	
Ditto, other kinds	618,000	2,600,000	
Tin	944,000	1,501,000	
<i>Total of Metal Manufactures</i>	7,679,000	15,343,000	
VARIOUS—			
Apothecaries' wares	363,000	593,000	
Agricultural Implements	47,000	255,000	
Beer and Ale	559,000	1,868,000	
Bleaching materials	79,000	97,000	
Books	229,000	495,000	
Bricks	41,000	75,000	
Cabinet and upholstery wares	102,000	223,000	
Candles	98,000	239,000	
Caoutchouc and Gutta Percha	32,000	189,000	
Carriages of all sorts	61,000	227,000	
Confectionery	37,000	135,000	
Cordage and cables	154,000	182,000	
Earthenware and porcelain	999,000	1,451,000	
Gunpowder	208,000	353,000	
Glass and glassware	308,000	653,000	
Hats of all kinds	155,000	317,000	
Leather: Saddlery and Harness	124,000	318,000	
other manufactures	303,000	1,407,000	
Mathematical and optical instruments...	35,000	66,000	
Musical instruments	86,000	145,000	
Oil	443,000	1,131,000	
Painters and colourers' materials	248,000	475,000	
Perfumery	51,000	86,000	
Plate, jewellery, and watches	286,000	429,000	
Plating for hats of straw, &c.	102,000	44,000	
Pickles and sauces	138,000	240,000	
Saltpetre (refined in United Kingdom)..	46,000	99,000	
Soap	201,000	250,000	
Soda	380,000	965,000	
Spirits	59,000	286,000	
Stationery	408,000	759,000	
Sugars	345,000	236,000	
Telegraphic apparatus	—	252,000	
Turnery and turners' wares	28,000	47,000	
Umbrellas and parasols	83,000	128,000	
<i>Total of various Manufactures</i>	6,838,000	14,715,000	
METALS, &c., UNWROUGHT—			
Coal, cinders, and culm	1,315,000	3,316,000	
Copper	662,000	750,000	
Iron and steel	3,845,000	8,292,000	
Lead	387,000	701,000	
Salt	21,000	120,000	
Spelter or zinc	224,000	358,000	
Tin	125,000	362,000	
<i>Total of unwrought Metals, &c.</i>	6,579,000	13,899,000	

TABLE 4 (continued).

	1850.	1860.
	£	£
ANIMALS AND ANIMAL PRODUCE NOT ALREADY MENTIONED—		
Horses	88,000	205,000
Bacon and hams	38,000	288,000
Beef and pork	29,000	93,000
Butter	211,000	638,000
Cheese	31,000	120,000
Leather, unwrought	182,000	403,000
Wool... ..	624,000	877,000
Fish, all sorts	338,000	554,000
<i>Total of Animal Produce, &c.</i> ...	1,541,000	3,178,000
FOOD—		
Corn, meal, and flour	38,000	211,000
Provisions not otherwise named ...	45,000	248,000
Unenumerated articles	1,885,000	5,109,000
<i>Total Exports of all kinds</i>	71,367,000	135,842,000

DISCUSSION.

The CHAIRMAN could not but congratulate the meeting upon the excellent paper which Mr. Ellison had favored them with that evening. A more comprehensive statement connected with the commerce of this country he had never had the opportunity of listening to. It was, indeed, full of facts of the utmost importance, and replete with matter of the deepest interest to a great country like our own, depending necessarily upon industry, trade, and commerce, for its supremacy amongst the nations of the earth. It could not fail to be noticed that our exports of machinery had largely increased—he would not say to an alarming extent—but to an extent that at least seemed to indicate increased competition with our manufactures in other countries of the world. Our great element of power, the steam-engine, had been increasing in export very considerably. Now, he did not, for a moment, disapprove of the exportation of these elements of prosperity to other parts of the world; but the fact being known, ought to stimulate our own energy, and direct it into channels likely to be profitable to ourselves; and we should take timely warning of the influx into certain markets of those elements of manufacturing industry which might, perhaps, displace our own at some not very distant day. Looking over the progress of trade in the Zollverein, our commerce with which had been much retarded by the prohibitive system which had existed there, he was struck with the important fact that, whilst generally our export of manufactured products to these States had scarcely increased, there was the accredited statement that their own consumption of raw cotton, during the comparatively short period of twenty years, had increased 600 per cent. Now we could not witness an effort of that kind in so important a country without expecting that the spirit of competition would be raised—if not to our injury, at all events to our displacement from many markets where we had hitherto enjoyed the privilege of mercantile intercourse. But here he recurred to the important admonition that we should take notice of the changes which were likely to interfere seriously with our own industries as sources of wealth. We saw that in Europe generally our exports had been comparatively languishing, whilst to the new countries our exports on every hand had been increasing. It was satisfactory to find that to South Australia and our colonies we had the means of sending forth increased quantities of the products of industry. If those markets had not been opened, it was clear the trade we enjoyed would not exist to the amazing extent to which it had now attained; but it was a question whether, after all, this increase could be maintained; for, unless our own Government called upon the Governments of foreign nations to remove the obstructions which prevented the freedom of intercourse which this country has established for itself, we must expect to see our foreign trade decline rather than advance.

He had great pleasure in witnessing the benefits which had resulted from the French Commercial Treaty, obtained scarcely more than a year ago. He saw present a gentleman who assisted in bringing about that happy result, and he was sure France would benefit quite as much by commercial intercourse with this country as we should do. It should never be forgotten that it was the consumer who ought to have his interests considered, rather than the producer of an article. At the present time, in the Zollverein the interests of the producers of manufactures were consulted, just as in the Morrill treaty the interests of the manufacturers were allowed to predominate. The interests of the consumer should be maintained by every wise government, just in the same manner as our government had the spirit to repeal the paper duty for the benefit of the consumer, regarding with no sympathy the monopolies of a few manufacturers. If this spirit of enlightened legislation prevailed over the whole field of commerce, he scarcely knew any bounds to the extension of it; but if we were to have that extension, we must have fair and sound principles maintained in our own country, and promote their adoption as far as possible in every country with which we were privileged to have intercourse. He would just observe, in passing, that he did not perfectly agree with Mr. Ellison in the remarks he had made on the subject of Indian cotton. It was at the present time a most interesting question; being as he (the Chairman) was identified with that great industry, he felt the deepest interest in anything which concerned its welfare, and he was anxious that the supply of the raw material should be as large as possible, and, above all, he hoped it would be largely obtained from free sources. Mr. Ellison had said it seemed now to be conceded that Indian cotton could not compete with American. As a general statement that was quite correct, but he (the Chairman) had the satisfaction of stating that he had repeatedly and very recently seen as good and useful cotton from our Indian possessions as we needed to have, or as we had had from the States of America; and therefore, if in many instances our East Indian possessions could supply us with really useful cotton, why should this not be done more extensively? He believed there were no impediments but such as might be regarded as obstacles to the progress of the industry itself. If European intelligence and capital found their way into the interior of India—if roads could be formed, if canals could be constructed, and if irrigation could be given to assist the arid atmosphere of India—he had no doubt abundance of useful cotton might be obtained. The statement of Mr. Ellison was, however, correct, when he said that when a weaver or spinner was engaged on inferior East India cotton, his labour was less productive, perhaps to the extent of 25 per cent. For instance, a young woman earning as much as 20s. per week on good American cotton, would be brought down to 15s. when employed upon inferior East India cotton. But let them not make the mistake of comparing good East India cotton with inferior East India cotton. Let them be placed in the right position, and they would then arrive at right results. There was no question that in that part of India where American cotton planters landed twenty years ago, and inculcated a better system of cultivation, a superior description of cotton was produced. In Berar, the central district of India, there was a large field where beautiful cotton could be grown, and sent to European markets. He hoped the Government would cause all fiscal obstacles to be removed. He asked for no special favours for trade, commerce, or industry, but he asked that every obstruction should be removed, and the largest range afforded both to labour and capital. By the wise development of both those elements, they would at no distant period receive large supplies of raw cotton from India. As a cotton spinner, he had used most beautiful cotton from that country. Why should those good qualities be the exception? He knew no reason why they should not be the rule. Let them not forget the fact that the American cotton industry was the result of skill, of capital, and of labour. The Ameri-

can planters had had their little agricultural associations, in which they had freely exchanged their opinions, where they had publicly taught the best methods of growing and maturing cotton. Let us employ the same means in our British possessions, and we should have the same results—let us endeavour to direct intelligence wherever British influence extended, and then we should reap the reward of our exertions.

Mr. P. L. SIMMONDS said that he was sure that all those who had listened to the very valuable and important paper which had just been read, would admit that it had been dealt with in a most exhaustive and masterly manner; and he was glad to find that so useful a mass of statistical information had been elicited from his friend, Mr. Ellison, who had shown his thorough capability to deal with this highly comprehensive and deeply interesting subject. There were few persons who could have grappled with the immense mass of figures and details embodied in that paper, which from kindred investigations he, Mr. Simmonds, knew must have involved an immense amount of reading and research, as well as much arithmetical calculation. The number of bulky blue-books involved in such an inquiry as that before them would frighten many to look at, much less to search through. But not only had the yearly statistical abstracts of our own trade and navigation been laid under contribution, but from the observations and deductions as to the progress and conditions of trade and manufactures in foreign countries, the consular reports, and the reports of our Secretaries of Legation had evidently been carefully studied. Such a retrospect was especially valuable to business men and manufacturers, as showing the ebbs and flows of trade, and where our manufactures had gained or lost ground in different markets. It was certainly satisfactory to our industrial progress to find that our foreign shipments had advanced more in the last ten years than in the previous thirty years. It was especially satisfactory to notice the great extension of trade into new quarters by the enterprise of our manufacturers and merchants. Our colonial trade was certainly progressing satisfactorily. There had been, as was shown, an increase of seven millions in the value of our exports to Australia in the ten years. While our manufactures were spreading largely among uncivilised and newly opened countries it was to be hoped that the older countries of Europe would become better customers. It was true, as had been pointed out by the Chairman, that our exports of metals and machinery had been very large, and these were the very elements of our industrial strength, weapons which would be turned against us in the production of cheap manufactured goods. But very much of the iron exports and machinery, in which a fourfold increase had been shown, was for railroads in our colonies, and steam-engines for saw, flour, and other mills, and for steamboats, which were fast extending in various new districts. Africa and Central Asia, the interior of China, Japan, and South America were being opened to our commerce, and it was satisfactory to notice the very marked progress making in Central and Western Africa, by the extension of legitimate trade, for which there was now an opening even in Madagascar. From his connection with the International Exhibition, he knew that the products and articles to be exhibited from these would be very interesting; and, moreover, he was sure our British manufacturers would be able to compete creditably, in most branches of industry, with their foreign competitors.

Mr. NEWMARCH would not have offered any observations but for the opinion which had just been expressed from the chair—that it was essential that the Government of this country should avail itself of all opportunities of removing commercial restrictions in other countries—that they should follow out the policy of which they had an example last year in the commercial treaty entered into with France; and the Chairman referred to the successful operation of that treaty as a cogent reason why that

policy should be followed. Now, with all deference, he must say he regarded that policy as a mistake—not that he was opposed to the extension of commerce, still less with the country nearest to ourselves. He was as anxious as anyone could be to see an increase of trade, not only with France but with the world, but he demurred to the doctrine that in order to increase our commerce we ought to multiply commercial treaties with foreign Governments. If a country desired to increase its trade it should increase its imports, and the way to increase the imports was to lower the customs' duties. It was in our power to have increased our trade with France to any extent by lowering our own customs' duties. We had no occasion for a treaty in order to increase that trade. Let us consider what would have been the position of this country if the apprehensions lately entertained of a war with America had been realised. We had made a treaty with France, by which we had bound ourselves not to raise the duty upon French wines beyond a certain point. If we had found ourselves at war with America, and if it had become necessary to raise an additional fifteen or twenty millions by taxation, we should have been in the position of not being able to increase the import duties on such luxuries as wines and silks, and the increased taxation must have been raised by extra duties upon tea, coffee, sugar, and other articles of general consumption, and by an augmentation, probably, of the income tax; but if the policy of free trade had been adopted with France, we should have been bound by no such fetters. We could have kept the regulation of our own revenue in our own hands, and should have been masters of our own fiscal policy. If it had suited our policy to lower the duties in one year, we could have done it; if in another year it had been necessary to raise those duties, we could have done it. We could have managed our own affairs as we liked. He therefore begged to enter his protest against the doctrine of commercial treaties, although he was in favour of extended commerce; but it was a retrograde movement, after having been familiar with the doctrines of Adam Smith for the last seventy or eighty years, to have it suggested now that if we desired to extend our trade we must fetter ourselves by commercial treaties. Mr. Ellison had told them of the enormous progress of trade during the last ten years. If they analysed the great mass of facts laid before them, they would find that at the bottom, four great leading principles operated. The extension of our trade during the last ten years had been governed by four principal causes. The first was the adoption of free trade principles in this country fourteen years ago, and on a more extended scale ten years ago, when free trade was adopted in its largest sense. The second cause, no doubt, was the gold discoveries in California and Australia. The third was the marvellous advance which had been made in arts and science; and the fourth cause was the establishment of new settlements and colonies all over the world. Those, he believed, would be found to be the four great causes which had led to the extension of our foreign commerce during the last ten years. He was not one of those who looked with anxiety to the future. He believed the foreign trade of this country had never been in a more sound, or healthy, or progressive position than it was at present, and he believed this was because we had thrown ourselves into the commercial contest regardless of protection and all other artificial devices of that nature. We should be able to maintain our position by doing better and going further than other nations, and so long as we did not blind ourselves by relying upon positive treaties he believed we should have no reason to fear the results for the future.

Mr. OUTHVIE remarked that it was a very difficult, dry, and arduous task to investigate the statistics of the trade of this country. Mr. Ellison had shown them the extraordinary progress they had made in the last ten years. That progress was no doubt owing in a great degree to the free-trade measures which had been adopted by various

governments during that period, which policy had been commenced in this country by Sir Robert Peel in 1842, following in the steps of Mr. Huskisson in 1823-4. Notwithstanding the enormous development of our commerce, even to the most remote regions of the earth, we had still before us a wide field in every part of the globe—more particularly in India and China. With regard to the latter country Mr. Ellison had touched only lightly upon the rapid increase that had taken place within the last few years in the imports of tea. A year or two since the consumption amounted to 55 millions of pounds, and the imports to about 66 millions; last year the consumption was 77 millions, and the imports 99 millions of pounds, and that increase he had no doubt would go on. He fully concurred with the Chairman in the opinion he had expressed with regard to commercial treaties. He (Mr. Ogilvie) belonged to a department of the public service which had been taunted with being great sticklers for routine. They were not the only ones, however. Some of his friends, the advocates of free trade, appeared to be equally sticklers for routine in objecting to commercial treaties because they were not according to the routine of free trade. Looking at the commercial treaties which had been entered into in the present century, they found that the treaty concluded with France, by Pitt, was not one based upon free trade principles, because that treaty was with France exclusively. England admitted the products of France at low duties, and the action was reciprocated on the part of France with regard to the productions of this country, but although we had lately made a treaty with France, we had at the same time opened our ports to the commerce of the whole world. We had not made a tariff of duties for France alone; and it must be borne in mind that that treaty was not made simply as a bargain for the progress of free trade. If we had not concluded that treaty Mr. Gladstone would no doubt have introduced the great financial measures he had so long promised, and which he had the opportunity of introducing in 1860; but there was a great reason why this treaty should be made, and why the Emperor of the French adopted it. That was that it enabled him in a few months to bring about that which in England, with all our cherished free trade notions, it took forty years to accomplish—viz., the introduction of foreign manufactured articles at a low duty, thus destroying the monopoly of French manufacturers. That could only be done in two ways:—either by an act of the national legislature, or by the Government under a reciprocal treaty. The Emperor adopted the latter course, which gave his Government the power of doing it immediately. Therefore there was great gain to the world generally by that treaty, the beneficial results of which we had seen in this country during the few months in which it had been in operation. The exports to France this year amounted to four millions more than they did three years ago, though only three months had yet expired. It was very well to say that if we set the example of free trade other nations would follow it, but it was found in practice that they did not. The only way was to persuade them into it, and that could only be done in the first instance by treaties. He hoped they should be able to effect similar treaties with the Zollverein and other countries in which there had been but a slow increase in the amount of exports of the manufactures of this country, and he hoped that principle would be acted on as far as possible by the present government whenever an opportunity for it was afforded.

Dr. M. MEEKINS thought the best defence of commercial treaties was to be found in the fact that they tended to accelerate the action of foreign Governments. France might have gone on for twenty years longer without adopting free trade, whereas a few months had served to bring it about in that country. He thought it could not be denied that an immense development of the trade of England had resulted from the commercial treaty with France; and, with reference to the objections taken by Mr. Newmarch, he thought this country had gained more by the extension of its commerce by the

treaty than it was likely to suffer in the next ten years from its inability to vary the import duties upon the produce of France. With regard to our colonies, he thought the proper policy to pursue was to admit their productions into this country free of all duties. He thought all such imposts between the mother country and her colonies should be done away with; and, in like manner, he thought the colonies in which a legislature had been established ought not to be allowed to tax the manufactures and productions of the mother country.

Mr. HENRY ASHWORTH said, possibly many gentlemen present might not be aware that his residence and pursuits were in the north—in the manufacturing districts of Lancashire. He was an advocate of free trade, and ever had been. He had heard on this occasion a good deal of stickling about principle, and referring to the observations of Mr. Newmarch, he was also an advocate for forms and principles, as far as they could conveniently be carried out. They had been favoured that evening with a most elaborate statement of the enormous extent to which the various manufactures of our country had increased. He rather imagined that if those who were engaged in producing those manufactures, had been strictly tied down to forms and principles—if they had been made to work by the rule of three, instead of by the rule of thumb—they might at some future day have reached an amount equal to the present scale of exports; but he very much doubted whether, at this early period, they would have attained a mercantile position so exalted as that which had been disclosed to them that evening. With regard to the cotton manufactures of Lancashire, with which he was better acquainted than with any other branch of our national industry, he would remark that, reverting back to a period not beyond that of our immediate forefathers, that county was about the least favoured in natural products, and, perhaps, the least hopeful of any in the kingdom, so much so that the surface of the country was barely able to support the few inhabitants upon it; but that which nature had denied to the surface had been awarded to their search under the surface. The inhabitants were possessed of indomitable industry, and it had been by dint of industry and by the discovery and application of the subterranean wealth—the coals and iron under their feet, that they had succeeded in manipulating and converting the raw material of cotton into an important element of commerce. It had been in this way that they had been enabled to raise up an industry and prosperity which stood unparalleled in the history of any manufacture ever established. In stating this he did so rather as an apologist of expediency, and of the advantage of immediate results, although an advocate for adhesion to forms and principles as far as practicable. The cotton manufacture had grown out of its own strength, and had without protection elaborated itself out of its own means and resources. Now, when they came to talk about conducting a large manufacturing industry, having in view to administer their commercial relations under regulations and theoretic principles, however applicable these might be in dealing with crude matter, which required no food, a systematic arrangement would break down when they came to deal with an industry which required to be sustained by food. In a country like this, which was unable to sustain itself out of its own productive resources of food, we were constantly indebted to other countries, not only for our daily bread, but also for raw material for manufacture; and amidst all the vicissitudes of life, and the fluctuations that took place in the seasons, we must bear in mind that the result of these inequalities fell eventually upon the working classes, either in giving them abundance at one period or scarcity at another. They would bear with him if he dwelt more particularly upon this subject at the present moment, because he recollected that, on leaving Lancashire, little more than twenty-four hours previously, he had been painfully impressed with the sight of skilful industry in rags, starving

in the streets; and when they asked him for food he did not stay to talk to them about theoretic principles, or about waiting till the effects of free trade in this country brought about a reciprocity of action in other countries. He was not one of those who were prepared to condemn the commercial treaty with France, nor to inquire very minutely whether it was, or was not, based upon the great principles laid down by Adam Smith, Ricardo, Stuart Mill, and others, who had done great good in elaborating that which some persons now called a science; but, he would say, when they had a people dependent upon their industry, and to whose skill a great portion of our national prosperity was owing, it ought to be a leading object, in dealing with our trading intercourse with other countries, to regulate, as far as possible, that freedom of action which would give to our dependent classes uniformity in their means of existence. This could not be done at all times, so long as all countries were not alike advanced in their knowledge of commerce. An event had unhappily overtaken the cotton manufacturers, which it had long been foreseen would come upon them in some form or other. It had been evident to his friend, the Chairman, and to many others engaged in the cotton manufacture, that at some period or other an event would occur in the United States of America which would probably cut off 85 per cent. of the amount of raw cotton. No one could contemplate the enormous effect which was produced upon the industry of Lancashire by the present war in the United States, producing the withdrawal of so large a proportion of the raw material of the staple industry of the district. But this had now occurred, and a few months hence the stock of raw material would have become so low that apparently the great bulk of the population of the district would require to be supported either from the poor-rates, by charity, or possibly from the imperial resources. With these weighty considerations before them, it behoved our countrymen to reflect whether means could not be found of producing the raw material over a wider portion of the earth's surface, and at the same time to consider whether, under the existing pressure, there were not arrangements requiring to be made in the various parts of the world which would enable them more effectually to regulate the supplies of raw material and the markets for their manufactures in a more agreeable and effectual manner than at the present time. India had been referred to as a source of supply, and he could most fully rely upon what had been stated by Mr. Heywood, the Commissioner from Manchester, and others, who had knowledge of India, to the effect that with deeper ploughing, more irrigation, better seed, and the application of capital, they could easily obtain from India cotton of the value of 20 or 30 millions sterling annually, instead of receiving, as they had usually done, some three or four millions' worth, and supplied with such irregularity. He would not in this place go into any criticism of the official management of affairs in India—he left those matters in the hands of the Council for India and the Legislature. In the next place, let them consider what was of urgent necessity to be done with regard to the markets for our manufactures. The prolonged war on the Continent of Europe had the effect of impeding a large portion of the intercourse which we had with continental countries; the markets became closed to our manufactures, and but little intercourse with the people or knowledge of the languages was retained. We had succeeded in extending our commerce to the most distant parts of the world, and had at length begun to consider whether there was not still some unoccupied space in Europe, and whether we could not establish a larger amount of trade in those parts of the continent where the people required, not plain inexpensive articles alone, but those also upon which a large amount of labour and skill were employed—articles of design, and various textile manufactures of considerable value. That, no doubt, was a great object to be attained. The Continental markets were close at hand. The trade with various parts of Europe would give speedy returns.

Happily Mr. Cobden had made an inroad in this direction by means of the treaty with France. He might be blamed by some for having departed from what perhaps might be considered the recognized principles of free trade; but he (Mr. Ashworth) could say that, whether he had or had not complied with sound doctrine, there had been during the past winter in many parts of Yorkshire, in Bradford in particular, full employment given to the operatives, instead of half employment, as the result of that treaty with the French Government. It was remarkable that with our existing diplomatic staff we had employed a private individual like Mr. Cobden to negotiate this commercial treaty. He was not a paid agent of the Government; what he had done he did as an amateur, and without hope of reward. But if they inquired how it was we had remained for so long a period having comparatively so little commercial intercourse with the Continent, he would call to their minds the description of persons whom we had sent out as the official representatives of this country. In every important place in Europe this country was represented in its commercial and other concerns by a consul. How was it then that these gentlemen had not discovered the importance of cultivating the commerce of this country? How had it happened that there had been the necessity for Mr. Cobden to go to Paris to make a treaty? The time had arrived when we must of necessity have larger openings for commerce in Europe. The time had come, or would very soon arrive, when those matters would force themselves upon the notice of the Chancellor of the Exchequer. If England must carry on an annual expenditure of seventy millions, that large sum could not be derived from ploughing the soil—it must come very largely from commerce, and from the industry dependent upon commerce. It became, therefore, most important, in a political point of view, to cultivate commercial intercourse to the greatest possible extent, whereby manufactures of every kind could be increased, and thus the population of the country would be enabled to sustain the burdens which rightfully devolve upon the nation. With regard to the paper itself there appeared to be nothing in it which had produced any discordant opinions; on the contrary, it had been well received, as it deserved to be. It was a most gratifying record of our national industry, and he hoped hereafter, if they lived another ten years, that some one would be found equally able and willing to provide the members of this Society with another paper, showing as triumphant a progress of our commerce as that which Mr. Ellison had laid before them that evening.

The CHAIRMAN, in proposing a vote of thanks to Mr. Ellison for his paper, said that gentleman deserved especial praise for the great labour he had bestowed upon this work, and for the masterly manner in which he had laid this subject before them. His views of political economy were sound and true, and he (the Chairman) was sure he was only speaking the sentiments of the meeting when he said they were greatly indebted to Mr. Ellison for the very able paper he had brought before them.

Mr. JOHN DILLON, in seconding the motion, said he had intended to offer a few remarks upon a subject in which he felt so deep an interest as this; but, highly gratified as he had been by the facts that had been brought before them, and agreeing with the arguments with which they were accompanied, he would not intrude upon the attention of the meeting further than to express a hope that, at the approaching Exhibition, the manufacturers of this country would excel in quality as much as he was confident they would in quantity.

The vote of thanks to Mr. Ellison having been passed,

The Secretary announced that on Wednesday evening next, the 12th inst., a paper by Mr. James Morris, entitled "The Mauritius: its Commercial and Social Bearings," would be read.

Home Correspondence.

TRADE MARKS.

SIR,—The Trade Marks Bill having been referred to a select committee, I take the liberty of troubling you with a few remarks thereon, in the hope that this subject may be discussed in your columns with all the attention it deserves. It seems singular that legislation should halt in dealing with a question of so simple a character. It is possible that a main impediment to its settlement arises from the severity of the proposal to deal with infringements as criminal instead of civil offences. There is a dislike to, as well as an impolicy in, Draconic legislation; and it seems unreasonable that while proven piracies of patents, and invasions of literary and design copyrights, are considered merely as grounds for civil actions, a novel principle of law should be introduced in treating imitations of trade marks, by subjecting the delinquents to the penalties of criminal law. Mr. Crawford's proposition to deal with all commercial frauds in a like manner, is at least intelligible and consistent. Now, if a practical protection be required, a system of registration, as already proposed by more than one able authority, should be adopted. Such a mode obtains as a serviceable protection for property in art-manufacture, in sculpture, in literature, and in some categories of invention: it has been adopted with advantage in France, and to some extent in Sheffield. The machinery for its administration is ready to hand in the Designs Registration Office, connected with the Board of Trade. As to Mr. Milner Gibson's objection in respect of cost, I conceive that to be a wholly untenable one. The cost need be but trifling; and what manufacturer could object to incurring a few shillings' expense, if he thereby rendered his property more safe, or more readily secured? So long as the sole remedy is by injunction, by suit in equity, or by trial in the superior courts, the dread of expensive litigation is likely to deter manufacturers from seeking to protect their rights; whereas an application of the registration law, with its contingent summary mode of jurisdiction, would present the same advantages in respect of copyright in trade marks, as it already does in regard to industrial designs. A long and intimate acquaintance with the operation of the Ornamental Designs Acts has convinced me of their utility. Their remedy for infringements is so simple and speedy, that fraudulent persons may well be deterred from infringing, and if a register were open for public inspection, as of course it should be, there would be small danger of, or excuse for, honest men innocently copying another manufacturer's trade mark.

But since "prevention is better than cure;" since the strengthening of the rampart is more advantageous than the chastisement of the invader; the adoption of a rational system of trade marks would be of immense importance. I submit that it would be wise, if, instead of the introduction of emblems or figures of objects, as trade marks, the law should restrict all trade marks susceptible of registration to letters, words, or numbers, or such like characters, or, better still, to a combination of letters and numbers. The adoption of such a system would render each trade mark more distinctive, more substantial, and, therefore, more secure; it would impart to it a sharply defined, and unmistakable idiosyncrasy; it would facilitate the process of registration as well as the searching of the registers, and, thence, the avoiding of infringements; and it would remove perplexity from the mind of registrar, magistrate, judge, or jury, as to similarity of rival works. These ends would be unattainable if fancy trade marks were adopted, which would be liable to occasion much difference of opinion on points of similarity. Moreover, the plan I propose would facilitate the operations of commerce, as a product might be readily indicated and known by its mark. A particular steel, a particular beer-label, marked A 50, for example, might

acquire and maintain as distinct a celebrity, and as defined a rank in the market and the store, as does at present the vessel registered A 1 at Lloyd's, in the underwriter's room and on Change. Of course, in citing such a comparison, I do not carry the analogy to the question of intrinsic value, for the mark I propose would be no test of superiority of quality, except in so far as might depend on the manufacturer, who should have adopted and registered it as his distinctive mark. I believe such a system would lead to a more general adoption and registration of trade marks, and therefore to a more general sense of industrial responsibility, and a higher standard of manufacturing and commercial probity; or, to adopt the well-chosen words of Monsieur Barrault, in his diligently-compiled book on the French trade-mark law, "imprimer un haut caractère de probité et de moralité à la fabrication et aux opérations commerciales, en répandant et généralisant l'emploi de la marque, sous la garantie de laquelle chaque fabricant et chaque négociant viendra placer la loyauté de ses produits."

I do not apologize for troubling you with this letter, believing your journal eminently adapted for the consideration of a question so intimately affecting the interests of manufactures and commerce.

I am, &c.,

M. HENRY.

84, Fleet-street, February 27, 1862.

THE TURKISH BATH.

SIR,—Although I do not believe in the possibility of a physical panacea, and therefore cannot believe that the Turkish bath can ever be a remedy for all the moral and physical evils which beset our humanity, I yet do believe that it is not only an instrument of great luxury, but a very powerful agent in the cure and prevention of disease.

I cannot agree with a speaker who said that the benefits to be derived from the bath must be determined by science, if by science was meant a knowledge of anatomy, physiology, and chemistry, for it is a remarkable and a very humiliating fact, that science, so called, has not, in any appreciable degree, advanced the healing art.

The use of quinine was discovered by savages, and opposed by science for many years. The effect of vaccination was a discovery of pure observation, but the practice thereof was denounced for many years by almost every man of medical "science" in the country.

So also of the hot-air bath. It has existed as a means of cleanliness and health for thousands of years; and not only have scientific medical men failed to appreciate its advantages, but it now seems a certain number of such men can only see in the bath danger and absurdity.

No medical man who has not experimented on himself and his patients, has any right to express a positive opinion in the matter, because medicine, as now practised, is not a deductive science, but only an experimental art.

Sir John Fife has probably had ten times more experience than any other medical man, of the operation of the bath in disease, and he testifies strongly in its favour. My own experience is comparatively limited, but the result of that experience is, that I have seen much good, but no harm, from the use of the bath in disease.

I will not say that no one has ever been injured by the bath; but such cases, so far as I have seen, have resulted from imperfect ventilation, or excessive heat; errors not inherent in hot-air baths, but the result of imperfect construction, or defective arrangements in individual baths.

It appears to me that a most thorough ventilation is a most essential element in the success of any hot-air bath; and as ventilation is equivalent to extra expense in fuel, there exists the temptation to under ventilate.

Abundance of fresh air after the hot-air process is finished, I also consider is a very essential element of success.

For my own part I have never had so refreshing a bath

as I had in Mr. Urquhart's private bath in the country, when, after the hot-air process, we sat in the open garden, with the frost and snow on the ground, covered only by a thin sheet, with the free air of heaven blowing over us.

A bath of this kind is truly invigorating, and under its influence one, although accustomed to wear flannels for years, can, without danger, at once dispense with them.

I will not say, with Mr. Urquhart, that hot-air baths should be substituted for hospitals, but this I will say, that the governors of any hospital who refuse to add a hot-air bath to the establishment, incur a very serious responsibility by neglecting a remedy which in many cases is more powerful than all the drugs in the "Pharmacopœia."

Conceive miserable, wretched men dawdling about the streets in dismal, wet, cold, and dirty nights, and crawling into gin shops! How infinitely better if they could go to some hot-air temple, erected let us say by teetotallers, and having their bodies washed and thoroughly warmed through, their clothes dried and freed of vermin, and after a good cup of coffee, could go home to their happy wives and children—wives and children who have hitherto trembled at their return—and all this moral and physical regeneration at an expense of say *threepence*. Builders should make it a feature of new houses to have a hot-air chamber constructed on the basement. By this means the entire house, together with the conservatory, might be heated. In cold winter mornings especially, a hot-air bath would be a temptation to early rising, and the individual indulging in it would become well prepared for the business of the breakfast table and the duties of the day, going forth to his work clear-headed and comfortable.

Finally, the hot-air bath appears to me the best remedy we possess for gout and rheumatism, and I would recommend it with confidence in the cold stage of cholera and ague. It is most useful in cases of internal congestion, and in many cases of indigestion, skin disease, neuralgia, and chronic bronchitis.

I would also recommend it in those cases of consumption which seem to demand a warm climate, as the hot-air bath will enable such individuals to take out-door exercise even in our cold and damp winter weather.

I am, &c.,

GEORGE WYLD, M.D.

SIR,—A custom observed among the Mexican Indians, on the south of the Columbia Region, is interesting in connexion with the recent discussion on this subject. Beechey, taking his account from my notes, has given a very cursory description of it at page 369, vol. i.

I will not give his extract, but precisely my own version of what I witnessed. The temeschal of the Aborigines, said to belong to them before the visits of Europeans, is deemed a religious ceremony. It is secret, and no women or boys are admitted. That which I inspected, when emptied of its men, was situated near a very cold pond, the temperature of which was about 50 in November. The house was constructed of pine logs, like a huge wigwam, about 60 feet on the sides and floor, the base being about 6 feet below the ground level. In the centre was a log-wood fire, and the entrance was about 6 feet above the ground-level; a notched log served for a ladder, and a door fitted closely, which was guarded by a sentinel outside.

This building accommodated 60 persons sitting in order behind each other at the outer circle. Each individual was furnished with a dry grass ball, and used it on the back and sides of his friend in front. With the heat from the fire, no escape for the smoke, and free use of the grass ball, it may be imagined they soon became reeking with perspiration. (This information I derived from Padre Thomas, the principal of the Mission.) At a signal the door was opened, and these individuals rushed out of the bath-room and plunged into the pond. But from what I witnessed they did not seem to enjoy the cold water. Yet these tribes are deemed especially filthy in their

habits, and are, when confined to the Mission houses, very unhealthy.

I have visited the tribes throughout America, and my conviction is that those who bathe most are enervated, and do not exhibit the great muscular strength we notice among the Indians north of the Oregon, or even the Esquimaux.

Again, coming back to the Eastern Archipelago, the bathers, particularly the Malays, are effeminate. The Chinese, who wash frequently, but with small doses of water, are robust. It has always occurred to me that undue perspiration was to be viewed as living on the principal instead of the interest of the constitution. If we require a home proof we have only to take Bermuda, constantly surrounded by the waters of the Gulf stream at 86°. People living in that vapour bath do not live long, and are subject to a species of rheumatism, termed break-bone fever.

I am, &c.,

EDWARD BELCHER

Proceedings of Institutions.

SOUTHERN COUNTIES ADULT EDUCATION SOCIETY.—The following address of condolence from this Society has been presented to the Queen:—"To the Queen's Most Excellent Majesty. May it please your Majesty,—We, your Majesty's most dutiful and loyal subjects, the officers and members of the Southern Counties Adult Education Society, humbly approach your Majesty with the expression of our sincere and respectful sympathy in the great loss and affliction with which it has pleased God to visit your Majesty, your royal children, and the nation, by the death of His Royal Highness the late Prince Consort. While warmly participating in the general sorrow, we claim to ourselves the mournful privilege of a special cause of regret for the loss of one to whom our Society owes a very deep and lasting debt of gratitude. When struggling with the difficulties of the establishment of such a society, and of drawing public attention to the neglected classes now so greatly benefited by educational institutions and night schools, the enlightened patronage and generous aid of His Royal Highness, freely and seasonably offered, carried our efforts to an unexpected and unexampled measure of success. The greatness of the nation's loss has been thus practically brought home to us. That God may be graciously pleased to sustain and comfort your Majesty in your affliction, and to grant you a long reign over a happy and grateful people, is the earnest prayer of your Majesty's most dutiful subjects and servants."

(Signed)

ASHBURTON, President.

SAMUEL BEST,

THOMAS BACON, } Hon. Secs.

And nearly 300 officers and members of the Society.

MEETINGS FOR THE ENSUING WEEK.

- MON.....R. Geographical, 8½. 1. Mr. H. Mouhot, "Travels in Cambodia." 2. Mr. Edward O'Riley, "Tour to Karen-ni, through the Shan States to Tungu." 3. Mr. Spencer St. John, late Consul-General for Borneo, "The N.W. Coast of Borneo." Medical, 8½.
- TUES....Medical and Chirurgical, 8½. Civil Engineers, 8. Mr. C. A. Hartley, "On certain Works recently executed at the Sulina Mouth of the Danube." Zoological, 9. Syro-Egyptian, 7½. Royal Inst., 3. Mr. John Marshall, "On the Physiology of the Senses." Architectural Museum, South Kensington, 8. Distribution of Prizes to Artist-Workmen. Address by the President.
- WED... Society of Arts, 8. Mr. James Morris, "The Mauritius: its Commercial and Social Bearings." Graphic, 8. Microscopical, 8. Literary Fund, 2. Annual Meeting. Roy. Soc. Literature, 8½. Archaeological Association, 8½.

- THURS...Royal, 8½.
Antiquaries, 8½.
Philological, 8.
Royal Society Club, 6.
Royal Inst., 3. Professor Tyndall, "On Heat."
FRI.....Astronomical, 8.
Royal Inst., 8. Mr. W. S. Savory, "On Motion in Plants and Animals."
Royal United Service Inst., 3. Major Strange, "Geodesy, especially relating to the great Trigonometrical Survey of India."
SAT.....Royal Inst., 3. Mr. Henry F. Chorley, "On National Music."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 17th February, 1862.

- North America—Correspondence respecting the Civil War (No. 1).
North America—Copy of Despatches, &c. (No. 2.)
North America—(International Maritime Law) Correspondence (No. 3).
North America—(Withdrawal of Consul Bunch's exequatur) Correspondence (No. 4).
North America—(Seizure of Messrs. Mason and Slidell) Correspondence (No. 5).
North America—(The "Nashville" and "Tuscarora") Correspondence (No. 6).
Princess Alice's Marriage—Treaty between Her Majesty and the Grand Duke of Hesse.
International Copyright—Accession of the Grand Duke of Hesse to the Conventions between Great Britain and Prussia.
Mexico—Copy of the Tripartite Convention.

SESSION 1861.

- Par.
Numb.
324 (A viii.). Poor Rates and Pauperism—Return (A).
Delivered on 8th and 10th February, 1862.
2. Agricultural Labourers (Ireland)—Return.
4. Coal Mine Accidents—Abstract of Return.
5. Friendly Societies (Scotland)—Report by the Registrar.
Poor Relief (Scotland)—Sixteenth Report of the Board of Supervision.

Delivered on 11th February, 1862.

7. Metropolitan Board of Works—Return.
10. Court of Session (Scotland)—Return.
2. Bills—Qualification for Offices Abolition.
3. Whipping.
Morocco—Papers relating to the Loan.
Morocco—Convention relative to a Loan.
Mexico—Correspondence.
Delivered on 12th February, 1862.
1. Public Income and Expenditure—Account.
8. Population, Revenue, &c.—Return.
9. Sale of Gas—Return.
16. Lunacy—Account.
1. Bills—Highways.
6. " Exchequer Bills.
China (Affairs of Canton)—Correspondence.

SESSION 1861.

495. Poor Law Unions—Return.
Delivered on 13th February, 1862.
17. East India (The "Nil Durpun")—Return.
18. Charitable Funds—Return.
19. Hartley Colliery Accident—Return.
25. General Committee of Elections—Mr. Speaker's Warrant.
26. Navy—Supplementary Estimate for 1861-62.
5. Bills—India Stocks Transfer.
7. " Parochial Assessments.
10. " Church Rates Abolition.
12. " Conveyance of Voters.
Queensland—Papers.

Delivered on February 14th, 1862.

4. Coal Mine Accidents—Return (corrected pages).
19. Hartley Colliery Accident—Return (a corrected Copy).
9. Bill—Marriages of Affinity.

Delivered on 15th and 17th February, 1862.

- *21. Army—Supplementary Estimate for 1861-62.
24. Court of Chancery (The Sutors' Funds)—Return.
33. Cities and Boroughs—Returns.
11. Bill—Metropolis Local Management Acts Amendment.
North America—Papers (No. 7) relating to the Imprisonment of Mr. Shaver.

Delivered on 18th February, 1862.

41. Navy Estimates for 1862-3.
8. Bills—Accidents Compensation.
16. " Church Rates Voluntary Commutation.
Education—Revised Code of Regulations, with proposed Alterations.
Delivered on 19th February, 1862.
15. Woods, Forests, and Land Revenues—Abstract Account.
22. Post Office Savings Banks—Regulations.
35. East India (Loan)—Return.
36. East India (Revenues)—Return.

39. Army (Effectives)—Returns.
42. Piers and Harbours (1. Mishnish Pier, Tobermory; 2. Oban Pier; 3. Pier and Harbour at Hastings; 4. Carrickfergus Harbour; 5. Deal and Walmer Pier; 6. St. Ives Pier (Cornwall)—Admiralty Reports.
13. Bills—Church Rates Commutation.
14. " Markets and Fairs (Ireland).
15. " Poor Relief (Ireland) (No. 2).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, February 28th, 1862.]

- Dated 23rd November, 1861.*
2950. E. de Wylde, 10, Great College-street, Camden-town—Imp. in paper-making machinery.
Dated 26th November, 1861.
2972. C. Stevens, 31, Charing-cross—An improved indelible anti-corrosive ink. (A com.)
Dated 24th December, 1861.
3221. A. V. Newton, 66, Chancery-lane—Improved means for reducing the friction and wear of slide valves of steam engines.
Dated 31st December, 1861.
3274. E. T. Hughes, 123, Chancery-lane—Imp. in saddles. (A com.)
Dated 13th January, 1862.
87. A. G. Southby, Bulford, Wiltshire—Imp. in the preparation of pulp for paper making.
Dated 15th January, 1862.
112. E. Lord, Todmorden, Yorkshire—Imp. in check straps applicable to looms for weaving.
115. J. Ridesdale, Minorities—Imp. in preparing sheet lead for covering floors, stairs, and other like purposes.
Dated 18th January, 1862.
137. S. Dreyfous, Paris—An improved throstle spinning frame. (A com.)
Dated 21st January, 1862.
150. J. Stenhouse, 11, Upper Brunswick-terrace, Barnsbury-road—Imp. in the protection of metallic surfaces, and in rendering certain substances less pervious to air and moisture.
Dated 23rd January, 1862.
171. J. Tomlinson, Liverpool—Imp. in washing machines.
173. F. W. Werner, Mannheim, Baden—An improved method of, and apparatus for, destroying vermin.
Dated 28th January, 1862.
213. J. List, Carisbroke, Isle of Wight—An improved means and instrument for obtaining distances and heights, and distances between distant objects without computation.
215. S. Smith and T. Smith, Nottingham—Imp. in the manufacture of cord and twine from mill spun yarns.
222. S. B. Lister and J. Warburton—Manningham, near Bradford—Imp. in preparing cotton for spinning.
228. R. Bodmer and W. Wilson, Newport—Imp. in the process of manufacturing artificial stones, parts of which improvements are applicable to the manufacture of artificial fuel.
Dated 29th January, 1862.
229. J. H. Brierley, Park-terrace, Halifax—An improved clasp or fastener for reversible belts, bands, or straps.
233. J. McKean and J. Gabbott, Walmer-bridge Mills, near Preston Imp. in sizing or dressing yarns or textile materials.
Dated 31st January, 1862.
269. H. White, 13, Mornington-place, Hampstead-road—Imp. in shirt collars.
Dated 1st February, 1862.
269. W. Smith, Bury—Imp. in machinery for the manufacture of bricks, tiles, or other articles of a similar nature or character.
273. J. Hill, 212, Piccadilly—Imp. in the construction of portable chairs and other articles for sitting or reclining on, road, Bath, invalid, wheel, and children's carriages, ambulances, or vehicles for carrying sick or wounded persons.
Dated 3rd February, 1862.
283. D. Joy, Manchester—Imp. in machinery for forging metals, also applicable to other purposes.
285. C. Stevens, 31, Charing-cross—An improved axle-tree. (A com.)
Dated 6th February, 1862.
313. R. Russell, Derby—Imp. in stove grates and kitchen ranges.
317. E. C. Willis, Addison-road, Kensington—Imp. in the treatment of wax and other substances of a similar nature.
319. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the preparation of pulp for paper. (A com.)
321. J. D. Dunncliff, Nottingham—Imp. in the manufacture of lace or net bonnet fronts and other similar articles, and in apparatus used in this manufacture.
Dated 7th February, 1862.
325. H. A. Silver, Silvertown, Essex—Imp. in the manufacture of trays, cases, and other similar articles, and bottles, in ebonite, vulcanite, or other hard india rubber.

327. A. McKenzie and F. Panthel, Glasgow—Imp. in sewing machines.

329. H. Macaulay and A. F. Notley, Rotherham—Imp. in fire guards.

331. H. Brinsmead, Ipswich—Imp. in apparatus for moving, elevating, cleaning, and dressing grain.

Dated 8th February, 1862.

333. J. Howie, Kilmarnock, Scotland—Imp. in regulating the consumption of fuel in furnaces.

327. James Carrington, Queen's-gate Mews, Kensington—Imp. in the construction and fitting up of stalls and horse boxes.

Dated 10th February, 1862.

339. M. A. F. Mennons, 39, Rue de l'Échiquier, Paris—Improved apparatus for the administration of vapour baths. (A com.)

[341. R. Philp and J. Philp, Lower John-street, Golden-square—An imp. in propellers for propelling ships, boats, and other vessels in water.

343. Commander B. C. T. Pim, R.N., Junior United Service Club, St. James's, and G. Fawcus, North Shields—Imp. in uniting iron plates, and in uniting and fixing armour plates on ships and other structures.

345. G. Smith, Holland-grove, North Brixton—Imp. in shawls.

Dated 11th February, 1862.

353. E. Sutton, Radcliffe, Lancashire—A certain imp. in machinery or apparatus for preparing cotton and other fibrous substances for spinning.

355. W. Lyall, Amiens, France—Imp. in machinery for preparing flax, hemp, and other fibrous substances.

358. J. Brinsmead, Charlotte-street, Fitzroy-square—Imp. in pianofortes.

361. J. J. McComb, Pump-court, Temple—An improved fastening for securing cotton and other bales or packages.

363. J. Hetherington, Manchester—Imp. in machinery or apparatus for preparing cotton and other fibrous materials for spinning.

Dated 12th February, 1862.

366. John Robb, Aberdeen—Imp. in ventilation, and in apparatus employed for that purpose.

367. J. Brickhill, 5, Stepney-causeway, Commercial-road-east—Imp. in the cylinders and pistons of steam engines.

369. A. Hinshaw, Aldermanbury Postern—Imp. in hooped skirts. (A com.)

370. R. A. Brooman, 163, Fleet-street—Imp. in preparing and ornamenting cast iron and other metals, in order to fit them for articles of furniture and decoration and other similar uses. (A com.)

371. J. S. Joseph, Rhostyllan, near Wrexham—Imp. in coke ovens, and in utilising the waste heat from the same.

[373. A. Samuelson, 21, Cornhill—Imp. in building ships and vessels.

Dated 13th February, 1862.

376. J. S. Joseph, Rhostyllan, near Wrexham—An improved retort oven, and the utilisation of the spare heat from the same.

383. C. D. Abel, 20, Southampton-buildings, Chancery-lane—Imp. in towing boats or other vessels on rivers, and in apparatus employed for that purpose. (A com.)

391. J. E. McConnell, Wolverton—Imp. in parts of boilers and furnaces for locomotive and other engines.

393. J. E. McConnell, Wolverton—Imp. in railway breaks, and in warming railway carriages.

395. W. G. Valentin, Oxford-street—An improved mode of and apparatus for coking coal.

Dated 14th February, 1862.

396. S. B. Whitfield, Birmingham—Imp. in the manufacture of iron bedsteads, and in the manufacture of ornamental iron tubes or columns for the construction and ornamentation of iron bedsteads.

397. A. J. Dodson, Clapham—An improved composition for coating, covering, or protecting ships bottoms, applicable also for coating or covering railway sleepers, telegraphic wires, and other surfaces, and likewise as a cement, and as a substitute for metal for certain constructive purposes.

328. W. Clark, 53, Chancery-lane—Imp. in mounting and fixing the handles or knobs of doors, furniture, and other articles. (A com.)

399. T. D. McFarlane, Glasgow—Imp. in sewing machines.

400. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for propelling ships and boats. (A com.)

401. W. F. Smith and A. Coventry, Salford—Imp. in, and applicable to, lathes for turning and cutting screws.

Dated 15th February, 1862.

406. G. H. Law, 17, Rochester-road, Camden New-town—Imp. in the construction of steam and other boilers.

408. C. Turner and J. Shaw, Leeds—Imp. in felted fabrics.

412. R. Bunting, Shetfield—Imp. in the manufacture of bolsters and scales, and in machinery employed therein.

414. R. Bell, 41, Westland-row, Dublin—Imp. in treating fabrics or articles composed of animal and vegetable substances, for the purpose of separating one class from another.

410. J. Green, Worcester—Imp. in the method of and apparatus for signalling, which improvements apply to signals used with steam ploughs or cultivators.

Dated 17th February, 1862.

418. F. W. Gerish, East-road, City-road—Imp. in pumps.

420. J. Hodgkinson and D. Greenhalgh, Bolton, Lancashire—Imp. in machinery or apparatus for preparing or combing cotton, wool, and other fibrous materials.

Dated 18th February, 1862.

430. J. Lees, the Rookery, Salterhebble, near Halifax—An improved trap for catching rats, mice, birds, and other animals alive.

434. W. Firth, Burley, Leeds—Imp. in machinery for digging or turning up soil.

Dated 19th February, 1862.

436. J. T. Pendlebury, Elton, near Bury, and G. Pendlebury, Totington-lower-end, Lancashire—Imp. in machinery for doubling, folding, or plaiting cloth.

440. W. B. Adams, Holly Mount, Hampstead—Imp. in springs, and their arrangement for moving and stationary purposes.

444. W. Davis, Spencer-road, Stoke Newington—Imp. in increasing the illuminating effect of coal gas and other gases.

446. J. Gregory, Wellington, Somersetshire—Imp. in candlesticks.

448. J. Wilcox, Ludgate-hill—Imp. in the manufacture of frills or ruffles, and in the machinery or apparatus employed therein. (A com.)

Dated 23th February, 1862.

450. J. Friedlaender, White Abbey, Antrim, Ireland—Imp. in machinery for scutching, breaking, and preparing flax, hemp, jute, and other fibrous substances.

454. R. T. Pritchett, St. James's-street—Imp. in targets or butts.

456. J. Paterson, Middle Temple—Imp. in means or apparatus for facilitating the evaporation of saccharine solutions. (A com.)

458. Lord A. S. Churchill, 16, Rutland-gate, Hyde-park—Imp. in electric telegraphs.

INVENTION WITH COMPLETE SPECIFICATION FILED.

509. J. Imray, 65, Westminster-bridge-road, Lambeth—Imp. in hinges. 25th February, 1862.

PATENTS SEALED.

[From Gazette, February 28th, 1862.]

February 20th.	2240. G. Norris.
2206. R. McConnell.	2255. J. Anthony.
2207. J. M. Rowan and T. R. Horton.	2332. J. Gurman.
2208. C. Edkins.	2357. W. G. Creamer.
2209. J. E. Ridges and J. Barker.	2558. W. Macnab.
2211. Peter Effertz.	2597. C. D. Abel.
2225. W. Spence.	2669. E. Chambers.
2231. J. Brown.	2715. J. H. Johnson.
2237. W. Ainsworth, E. Heap, W. Fielding, & E. Openshaw.	2745. M. Myers, M. Myers, and W. Hill.
2238. N. D. P. Maillard.	2920. J. H. Johnson.
	3197. J. Redfern.

[From Gazette, March 4th, 1862.]

March 4th.	2294. A. Green & W. H. Glover
2213. F. Bennett.	2334. J. Clough.
2229. C. F. Kirman.	2398. G. Russell.
2335. T. G. Messenger.	2411. S. Rowsell.
2241. J. Holland and G. Okell.	2511. S. Bremner.
2246. W. Simons.	2536. W. E. Newton.
2249. A. Fryer.	2543. W. E. Newton.
2253. R. A. Brooman.	2569. W. E. Newton.
2265. G. Greaves.	2988. H. Mearing.
2269. W. W. Clay.	3096. T. Higgins.
2275. P. Dubrule.	3252. J. P. Dormay, J. S. Aiken-head, and T. Johnson.
2286. J. A. Knight.	
2291. J. King and J. Sutcliffe.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, February 25th, 1862.]

February 25th.	664. W. Avery.
513. W. McNaught.	February 19th.
514. R. Fielden and T. Fielden.	528. G. Horner.
519. J. M. Dunlop.	

[From Gazette, March 4th, 1862.]

February 25th.	543. J. Templeman.
526. J. Howden.	544. J. Pile.
539. H. Moule.	545. D. Lichtenstadt.
510. F. Morton.	March 1st.
February 28th.	576. R. A. Brooman.
531. C. Hall and C. Hall.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, February 28th, 1862.]

February 20th.
445. H. C. Jennings.

[From Gazette, March 4th, 1862.]

February 28th.	March 1st.
454. G. M. Miller.	529. J. Bullough.
478. R. Body & T. C. Bridgman.	

Journal of the Society of Arts.

FRIDAY, MARCH 14, 1862.

NOTICE TO MEMBERS.

The Council have received the following Requisition, duly signed in accordance with the Bye-laws:—

TO THE COUNCIL OF THE SOCIETY OF ARTS.

WE, the undersigned, Members of the Society for the Encouragement of Arts, Manufactures, and Commerce, request you to call a General Meeting of the Members on an early day, for the purpose of recording their sense of the loss of their President, the late Prince Consort, and of considering the propriety of having a Memorial of His late Royal Highness in the Society's House:—And further, if the latter proposition be then agreed to, of appointing a Committee to decide on the most appropriate form of the Memorial, with full power to take such steps as they may think necessary for carrying out the same.

Dated this 26th day of February, 1862.

In compliance with the foregoing requisition, the Council hereby convene a General Meeting of the Members of this Society, to be held on Friday, the 21st day of March instant, at four o'clock, p.m.

By order of the Committee,
P. LE NEVE FOSTER,
Secretary.

Society's House, Adelphi, W.C., 13th March, 1862.

INTERNATIONAL EXHIBITION OF 1862.—SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

It is understood to be in contemplation to appropriate to those who take Season Tickets at an early date a certain number of reserved seats for the Opening Ceremonial on the 1st of May.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £446,700, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The high winds which have prevailed during the past week have caused considerable damage to the domes. Before the putty in which the sheets of glass were imbedded had set, the wind lifted many of them off, and threw them with great force on the building below, thus injuring also the roofing of the courts and of the picture galleries. These sheets of glass it is a matter of some difficulty to replace, as the scaffolding in the interior of the eastern dome has been, to a great extent, removed, but a plan has been invented of obtaining access to any part of the inside of the dome without danger to the workmen. The travelling scaffold is being taken to pieces, and as soon as that is accomplished a clear view will be obtained from end to end of the nave for the first time. The main building may now be said to be floored entirely, a path only being left for waggons with foreign goods to bring their contents to the western side.

Notwithstanding the immense speed with which the decoration is being pushed forward, much remains to be done; anyone, however, who has watched the rate at which Mr. Crace advances, will not despair of its completion at an early period. All the northern courts are as yet untouched, and the colouring of the columns in the nave and transepts below the gallery line has only just commenced. The large picture galleries, however, on the English side, are quite finished, and those belonging to the Foreign department very nearly so.

The western annexe shows some signs of recovery from the confusion which was noticed last week; the steam-pipes are all laid, and the pillars for the shafting nearly all erected. A large quantity of machinery, especially from abroad, has arrived, though as yet none is fitted. The boiler-house is advancing as rapidly as possible; all six boilers are on the spot, and three are already fixed in their places. The eastern portion of the other annexe is being floored very quickly, and it is now accessible by the tunnel which runs under the entrance to the Horticultural Garden.

Since the notice in last week's *Journal*, goods have been coming in very fast. From Brazil, 48 cases have been received; from Belgium, 10; from Russia, 55; and from the Zollverein, 721. Of pictures, 1 has come from Russia, 2 from Denmark, 3 from Norway, and 2 from Switzerland. The French, with the exception of two fittings, make no show in goods received, but they are busy making very great preparations for their display. Having received from Her Majesty's Commissioners a "carte blanche," to deal with their space as they thought fit, they have raised walls so as to enclose their court entirely from floor to roof. This has the effect, not

only of cutting the building in two, but also, as the French Commission will find to their serious loss, of impeding ventilation. In consequence, too, of the means of ingress and egress not being sufficient, an obstacle is offered to free circulation.

English exhibitors are also now beginning to make a show. Ten cases of encaustic tiles have come from Messrs. Maw, of Broseley, in Shropshire; Lady Mitchell has sent two Chinese screens, a portion of the loot of the Summer Palace; Messrs. Purdie, of Oxford-street, are busy on a piece of ceiling decoration, and several cases of pottery have come from Edinburgh. In the nave and transepts some of the trophies to be erected have been commenced. Mr. Skidmore, of Coventry, has erected a great portion of his screen, and Messrs. Naylor and Vickers, of Sheffield, and the Coalbrookdale Company, are laying foundations for their bulky exhibits. In the nave Mr. Wilkins has raised the mast of a light ship.

MOSAIC WALL PICTURES FOR DECORATING THE BUILDINGS ERECTED FOR INTERNATIONAL EXHIBITIONS.

It is proposed to raise sufficient funds to execute two large Mosaic Pictures, 23 feet high by 13 feet wide, as experiments for decorating the panels of the outside walls of the permanent Picture Galleries for International Exhibitions in Cromwell-road, South Kensington. The Mosaics will be made of pottery, in geometric forms, by the pressure of dry powder. Various experiments in laying the Mosaics have been made by Messrs. Minton (Stoke-upon-Trent) with Mosaics of their own manufacture, and by Messrs. W. B. Simpson and Sons, of 456, West Strand, with Mosaics manufactured by Messrs. Maw. The experiments are very promising; and they prove that Mosaic pictures may be as easily worked and used in England as in Ancient Greece and Rome, or Medieval Italy. They will be as imperishable as the hardest and most perfect Terra-cottas. They will create a new branch of industry, which may be worked in any locality, and, probably, by women as well as men.

The designs will illustrate Industry, Science, and Art. Some Cartoons have been already prepared by Mr. Cope, R.A., Mr. J. C. Hook, R.A., Mr. Godfrey Sykes, and Mr. Townroe; two of these will be executed in Mosaics as soon as the funds are provided.

The ornamental borders will be designed and the Mosaics worked out under the superintendence of Mr. Godfrey Sykes and his assistants.

When two panels have been done, and all the necessary arrangements have been made, after the close of the Exhibition of 1862, for filling the others, designs from other subjects will be sought from the artists named below.

The following are the principal subjects which,

at present, it is proposed should be executed, and the Artists named are those who have already kindly consented to undertake to make designs for them, when the proper period arrives.

I. SUBJECTS ILLUSTRATING THE PRODUCTION OF RAW MATERIALS.

1. Agriculture, Holman Hunt; 2. Chemistry, W. Cave Thomas; 3. Fishing, J. C. Hook, R.A.; 4. Hunting, Frederick Leighton; 5. Metallurgy, Eyre Crowe; 6. Mining, F. Barwell; 7. Planting, &c., Michael Mulready; 8. Quarrying, G. F. Watts; 9. Sheep Shearing, C. W. Cope, R.A.; 10. Vintage, F. R. Pickersgill, R.A.

II. SUBJECTS ILLUSTRATING MACHINERY.

3. Astronomy, S. Hart, R.A.; 2. Engineering, (reserved); 3. Horology, (reserved); 4. Mechanics, (reserved); 5. Navigation, J. E. Millais, A.R.A.; 6. Railways, R. Townroe.

III. SUBJECTS ILLUSTRATING MANUFACTURES AND HAND LABOUR.

1. Bricklaying, D. Maclise, R.A.; 2. Carpentry, R. Burchett; 3. China Painting, H. A. Bowler; 4. Glass Blowing, (reserved); 5. Iron Forging, Godfrey Sykes; 6. Jewellery, D. G. Rossetti; 7. Lace Making, R. Redgrave, R.A.; 8. Metal Casting, A. Elmore, R.A.; 9. Printing, R. Redgrave, R.A.; 10. Straw Plaiting, C. W. Cope, R.A.; 11. Weaving, Octavius Hudson; 12. Pottery, Godfrey Sykes.

IV. SUBJECTS ILLUSTRATING FINE ARTS.

1. Architecture, W. Mulready, R.A.; 2. Painting, W. Mulready, R.A.; 3. Sculpture, W. Mulready, R.A.; 4. Music, J. C. Horsley, A.R.A.

The designs before they are executed will be approved by a Committee of the Artists.

The Marquis of Salisbury, K.G., Mr. Layard, M.P., and Mr. Cole, C.B., act as a Committee of Management for carrying out the experiments, and all communications should be addressed to G. F. Duncombe, Esq., Secretary, South Kensington Museum, London, W.

SUBSCRIPTIONS PROMISED.

	£	s.		£	s.
The Society of Arts	105	0	Capt. Harris, E.I.S.	1	1
The Earl Granville,			G. Gilbert Scott, Esq.,		
K.G., Lord Presi-			R.A., Architect to		
dent of the Council			the Dean and Chap-		
and Chairman of			ter of Westminster	3	3
H.M. Commission-			H. T. Hope, Esq.	10	0
ers for the Exhi-			John Keld, Esq.	10	10
bition of 1862	10	10	The Lord Henry. G.		
The Marquess of Sa-			Lennox, M.P.	1	1
lisbury, K.G.	10	0	Right Hon. R. Lowe,		
Capt. Fowke, R.E.	10	10	M.P.	1	1
H. Cole, Esq., C.B.	10	10	C. D. Fortnum, Esq.	1	1
R. Redgrave, Esq.,			J. Hubert (Messrs. J.		
R.A.	5	5	Woollams, & Co. .	5	0
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dent of the Royal			C. A. Cole, Esq.	1	1
Academy	5	0	J. C. Macdonald, Esq.	1	1
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C.B.	1	1	Company	10	10
Sydney Smirke, R.A.			J. Webb, Esq.	5	0
Professor of Archi-			A. Barker, Esq.	5	0
tecture in the Royal			Sir S. M. Peto, M.P.	10	10
Academy	3	3	Charles Lucas, Esq.	10	10

£	s.	£	s.
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D. Roberts, Esq. R.A.	1 1	F. C. Penrose, Esq.,	
Jas. Heywood, Esq..	5 0	Architect to the	
J. G. Frith, Esq.	5 0	Dean and Chapter	
T. Sopwith, Esq.,		of St. Paul's Ca-	
F.R.S.....	3 3	thedral	1 1
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R. Cobden, Esq. M.P.	1 1	The Rt. Hon. The	
W. T. Mackrell, Esq.	1 1	Lord Mayor of	
T. Winkworth, Esq.	1 1	London for 1861-2	5 5
G. F. Wilson, Esq.,		Sir J. Paxton, M.P.	5 5
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Miss Margarita Bell	1 1	yan, K.C.B.	2 2
Rt. Hon. W. Cowper,		R. Monkton Milnes,	
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J. Sheepshanks, Esq.	1 1	S. R. Griffiths, Esq.,	
Sir C. Wentworth		Chairman of Board	
Dilke, Bart., Com-		of Works, Ireland	5 0
missioner for the		A. H. Layard, Esq.,	
Exhibition of 1862	5 0	M.P.	5 0
Mr. Alderman Sal-		Talbot Bury, Esq....	1 1
mons, M.P.	1 1	R. G. Wilde, Esq... 1 1	

Subscriptions may be paid to the account of "Mosaic Wall Pictures Fund," Messrs. Courts, Strand, London; or to Mr. S. T. DAVENPORT, Financial Officer, Society of Arts, Adelphi, London, W.C.

THIRTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 12TH, 1862.

The Thirteenth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 12th inst., J. Griffith Frith, Esq., Member of the Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Adam, John	11, Pudding-lane, E.C.
Cooper, Sir Daniel.....	20, Prince's-gardens, W.
Darvill, Henry	Windsor.
Dodgson, Wm. Oliver ...	{ 26, Royal Exchange, E.C., &
Ferrabee, Henry	{ Woodford, Essex. N.E.
Fitch, Lewis, F.S.A. ...	{ 75, High Holborn, W.C.
Latham, John	{ Thorpe-hall, Elkington, near
Mallett, Henry	{ Louth, Lincolnshire.
Nash, Edwin	{ 5, Adelaide-place, London-
Phelps, Charles	{ bridge, E.C.
Porter, Wm. P.....	{ 18, Montague-place, Russell-
Rogers, Francis	{ square, W.C.
Russell, Thomas	{ 15, Finsbury-place South,
Sargood, F. J.	{ E.C.
	{ 2, Arundel-place, Barnsbury-
	{ park West, N.
	{ 18, Cheapside, E.C.
	{ 76, Coleman-street, E.C.

Sewell, Charles Brodie, } M.D.	75, Guildford-street, Russell- square, W.C.
Summerlin, Thos. Hopkins	13, Clifford's-inn, E.C.
Thompson, James	{ Kinburn-house, Lower Tulse- hill, S.
Williams, Walter	{ 137, Fenchurch-street, E.C., & Penton-house, Newing- ton, S.
Wood, Chas. Wm.	{ Southfields, Wandsworth, S.W.
Yapp, G. W.	{ 37, Arundel-street, Strand, W.C., and Hereford-lodge, Old Brompton, S.W.

The following candidates were balloted for and duly elected members of the Society:—

Brand, James	{ Bedford-hill, Balham, Sur-
	{ rey, S.
Crace, John Dibblee	{ 14, Wigmore-street, W.
Crosley, Sir Chas. D	{ 6, Kensington-garden-ter., W.
Davis, Samuel	{ Swerford-park, Enstone, Oxon.
Dean, Albert A.....	{ 8, Ludgate-hill, E.C.
Devas, Thomas	{ 63 and 64, Cannon-st. West,
	{ E.C., and Mount Ararat,
	{ Wimbledon, S.W.
Dowling, Thomas	{ South Sea House, Thread-
	{ needle-street, E.C.
Eagle, George C.	{ 137, Upper Thames-st., E.C.
Eaton, Richard	{ Arnot-hill, Nottingham.
Edwards, Samuel	{ Manor-park, Streatham, S.
Gay, David.....	{ 74, Cheapside, E.C.
Harry, Wm. Dyer	{ 19, Gutter-la., Cheapside, E.C.
Hill, Frederick	{ Helston, Cornwall.
Jones, Jas. Patteshall	{ 112, Fenchurch-st., E.C., and
	{ Roselands, Enfield, N.
Laird, William	{ Conservative Club, S.W., and
	{ 23, Castle-street, Liverpool.
Linington, A. H.	{ 58, Fenchurch-street, E.C.
Maw, Charles.....	{ 11, Aldersgate-street, E.C.
Orde, Sir John Powlett,	{ Kilmory-house, Lock Gilp
Bart.	{ Head, N.B.
Palmer, Ebenezer	{ 18, Paternoster-row, E.C.
Pattison, Henry John ...	{ 5, Martin's-lane, Cannon-st.,
	{ E.C., and 18, Boundary-
	{ road, St. John's-wd., N.W.
Phillips, Major-Gen. Sir	{ Senior United Service Club,
Travel.....	{ S.W.
Sewell, John	{ 26, Nicholas-lane, E.C.
Seyd, Ernest	{ 2, Finch-lane, E.C.
Skilbeck, John	{ 202, Upper Thames-st., E.C.
Thompson, Edward	{ Salter's-hall, St. Swithin's-
	{ lane, E.C.
Westfield, Thomas Clark	{ 91, Great Tower-street, E.C.,
	{ and Ashenore-house, Keston.

The Paper read was—

MAURITIUS: ITS COMMERCIAL AND SOCIAL BEARINGS.

By JAMES MORRIS.

INTRODUCTION.

One of the prominent characteristics of the present day, and one most beneficial in every point of view, is the attention which is given to the colonial empire of Great Britain. Various circumstances have brought about this desirable investigation, the result of which has been that even the public themselves have begun to take an interest in colonial history. The time is now gone by for ever when a colony can be despotically ruled, or even long misgoverned; the time has gone by when that liberty which was enjoyed by the metropolis was denied to the colonies, or as Montesquieu has well said, in that noble work "*De l'Esprit des Loix*," "When liberty was at the centre, but tyranny at the extremities." (Liv. xi. c. 19).

As the direct interference of England in the internal management of the colonies has been gradually, of late years, diminishing, and must for the future be more diminished still, it therefore becomes more important that Parliament and the public should have a clear insight into the political, social, and commercial life of the vast and numerous dependencies of England. This knowledge, which is gained by the people of Great Britain, will react most advantageously on the colonies themselves; but it must be a knowledge founded on no preconceived theories, either of colonial worthlessness or of colonial perfection, still less must it be that knowledge round which the mists of prejudice cling, tinged with a darker or gloomier shade, by the recollections of that system of slavery which once existed in so many of them, and which it will be the enduring glory of England to have abolished. Nor must it be a mere blue-book knowledge; for though no one values more highly than I do the vast importance of statistics if rightly and philosophically used, still this is not all; the inner life of the colonies must be developed and studied, and England must look upon them as a mother upon her children, ever anxious for the correction of their faults, but ever anxious also for the expansion of their nobler and better qualities, which she herself has imparted to them, and which they should be proud to emulate and surpass.

It is for this reason that the country should highly appreciate the services of Institutions like the Society of Arts, where, from time to time, monographs of the different colonies, (if I may use such an expression), have been given by men competent to do so by their local knowledge and experience. Such a "monograph" I propose to give this evening of the colony of Mauritius; small indeed, but celebrated in history, and dear to the storm-tossed navigator, who finds there, at most periods of the year, a safe asylum where every want may be supplied. From its admirable geographical position, reposing calm like a lagoon in the midst of the Indian Ocean, Mauritius has always been regarded as a most important point. To the Frenchman it will always be dear as "La belle Ile de France," which the romantic genius of Bernardin St. Pierre has immortalised in his "Paul et Virginie;" while to an Englishman it will be equally dear from the recollection of the losses which its cruisers entailed on his commerce, and from the struggle which it cost him to wrest it from his rival. But, above all, it will be interesting to the philanthropic statesman as the island upon which the battle of free against slave labour was first really fought and triumphantly vindicated; where the great problem of Coolie immigration was practically solved; and where the skill and perseverance of the planter have rendered it one of the most important sugar colonies of Great Britain. I therefore propose to treat, as briefly as possible, the historical, physical, and social conditions of Mauritius, dwelling, however, somewhat more in detail on its commercial and industrial bearings.

HISTORY.

The early history of Mauritius, particularly that which relates to its discovery by the Portuguese, should be re-written. That "Cerne" (as the island was first called), and the adjacent island of Bourbon, were discovered by Don Pedro Mascarenhas, under the government of Don Almeida, in 1505, and that he gave his own name to the latter island, rests upon a pure assumption by Grant, in his "History of Mauritius," from which most other writers have copied the phrase without taking the trouble to investigate it. During last year I had occasion to examine all the Portuguese historians, and the Latin writers of the same nation, and I can assert that no mention whatever is made by them, or even is there any allusion to the discovery of these islands, which lie so much out of the usual track of the Portuguese navigators; and though several of the Mascarenhas are mentioned by the different historians of the early Portuguese discoveries, the name being a common one, still not the

slightest notice is taken of the discovery of these islands. Again, it was only in March, 1507, that Don Francisco Almeida sailed from Lisbon as Governor-General of India. Lopez de Castenada, who wrote in 1553 (*Hist. do Descub. de la India por los Portugueses*), though most minute as to the discoveries and exploits of his countrymen, is silent on this point, both in the editions of 1553, 1561, in the Italian translation published at Venice, 1578, and in the French translation published at Paris in 1563. The English translation, published at London in 1582, is equally so. Antonio Galvano, governor of Ternate, and most zealous for the glory of his country, makes no mention of this circumstance in his work on the discoveries of the Portuguese (*Descub. por los Portug.*), translated in Hakluyt, 1601. In the magnificent work of De Barros (*Decades da Asia, &c.*, Lisbon, 1552-1736), though the author is minutely careful in recording the deeds of the great Portuguese discoverers, no mention is made of these islands; Mendez Pinto (*Hist. Indica*) is equally silent. Faria y Souza, in his admirable history (*Asia Portuguesa*), published at Lisbon in 1666, and partly translated into English by Captain Steevens in 1695, dedicates several chapters to the exploits of Pedro de Mascarenhas and Francisco de Mascarenhas, though he makes no mention of this discovery. In the elaborate appendix to the third volume, detailing the possessions of the Portuguese, from the Cape of Good Hope to the furthest point of the East, and where he had such an excellent opportunity of amplifying the power of his country, and its glory also, by the magnitude of its discoveries, nothing of the kind is even hinted at. Osorio, in his work, "*De Rebus Emmanuelis Regis, 1571*," though particular and minute, is silent upon this point; and Mafiei, *Historia Indica*, 1582, though most circumstantial in other respects, makes no allusion to this discovery. Yet there is no doubt these islands were discovered by the Portuguese early in the sixteenth century, most probably soon after they visited for the first time Matatana in Madagascar. It has been said that perhaps "Cerne" was the island on which Ruy Pereira was wrecked on his return from the east coast of Madagascar, in company with Tristan Da Cunha, from whom he was separated in a storm; but a passage in Osorio is too clear and specific to admit of this meaning (*lib. v. p. 191*). An equal uncertainty prevails as to the date of the discovery of the island; nothing can be more discrepant than the dates of the various writers, ranging as they do from 1505 to 1545, and no clear statement of possession can be given until the first expedition of Admirals Van Neck and Wybrand Van Warwick, which, composed of eight vessels, left the Texel on the 1st of May, 1598. Van Neck commanded the flag-ship *Mauritius*, named after the Stadtholder, Count Maurice of Nassau, and which afterwards gave its name to the island which was accidentally discovered on the 17th of September of the same year, by the Vice-Admiral Van Warwick, whose ships, separated from their companions by a storm, reached the island of Cerne. Mauritius was the name he then gave it, and I trust Mauritius will be the name it will be known by for ages to come. From this time downwards all is clear. The Dutch held the island as a place for resting at in their voyages to and from the East, until they finally abandoned it in 1712; as they were establishing themselves at the Cape of Good Hope, they wished to reserve all their forces for the colonisation of that important point, which promised them a vast empire. This may be called the first period of its history; the second may be termed that when the island was taken possession of by the French, in 1715, and which concluded by the cession of the "Compagnie Française" to the Royal Government, in 1767. M. Dufresne, who took possession of the Island in 1715, called it Ile de France, the opposite island of Bourbon having been in French possession since 1664. During this period a celebrated name stands brightly forward, that of M. Mahé de La Bourdonnais, who was made governor of the colony in 1735. He was the real founder of the colony: the brave and indefatigable man who made it what it after-

wards became. He established a superior council, and developed order and union in the midst of disorder and anarchy. At the same time the administrator, the engineer, the architect, the agriculturist, he awoke the zeal and activity of every inhabitant. Hospitals, fortifications, and barracks were built; the sugar cane was successfully introduced; manufactures of cotton and indigo were established, and the manioc (*Iatropa manihot*), which was made into an excellent food, was introduced from the Brazils by his exertions. The name of La Bourdonnais is one of the proudest in Mauritian history; yet it was only lately that the idea was realised of erecting a statue to his memory in the colony which he had created.

The third period embraces that of the Royal government, from 1767 to 1790. The fourth, a period from 1790 to 1803, which may be called that of "Assemblées Coloniales," and the most prominent name of which is that of General Malartic, who, like La Bourdonnais, stands out in high relief for great ability and honesty of purpose. The fifth period dates from 1803 to 1810, under the government of the Captain-General De Caen, until the island was attacked and surrendered to General Abercrombie, in 1810 (3rd December). From this period, until 1849, the island was administered by military governors; but since that time a system more in accordance with the wants of a purely commercial colony has been carried out, and civilians have been appointed as governors, and from this change a degree of prosperity has arisen unparalleled in the annals of Mauritius. The governors selected were those who had been successful in the administration of other colonies, for, as Earl Grey well observed, "It is my opinion that the efficiency of the service as a whole would be increased by thus rewarding those who had distinguished themselves in it." (Colonial Administration, &c., p. 42.) Mauritius may, therefore, congratulate itself in the possession of such a governor as it now has in His Excellency Mr. Stevenson, a man of large and liberal mind, always active for the amelioration of the colony, independent enough to carry out his own views when his local experience tells him that such views are correct, and amply trusted by the government at home, so that the colonial and the governmental action are never brought into antagonism; the introducer of railways, the patron of free education, and the reformer of many sanitary and social abuses which at one time seemed to be inevitable in colonial life. Such selections as these are the real bonds of union between the colonies and the metropolis, and long may they be continued.

NATURAL HISTORY.

The Island of Mauritius, which is about 120 miles from Bourbon, and about 490 from Madagascar, is situated in the Indian Ocean, between the parallels of 19° 58' and 20° 33' south latitude, and 57° 17' and 57° 46' east longitude (from Greenwich). The form of the Island is nearly elliptical; its extreme length from Cap Malheureux (the landing-place of the English when the island was taken) to Cap de Brabant is 40 miles, its greatest breadth from Port Louis, the chief town, to Grand Port, is 30 miles. Its surface contains 432,680 acres, or 676 square miles. These estimates are those made many years back by the astronomer Abbé de la Caille, and the naturalist, M. Le Gentil; the late Colonel Lloyd published, in 1837, what he called a verification of these observations, but the island requires a new survey and a new map. Among the many excellent suggestions of the present governor was that of a trigonometrical survey, as the basis of a more perfect map than now exists; this however, has not yet been done. The writer of these lines suggested that a geological survey should also be made, and it appeared to him a peculiarly fitting time to do so when railways are about to be constructed in the island. He mentioned that some of the pupils of the Government School of Mines, who have so highly distinguished themselves in other colonies, and whose abilities were so much praised by Sir Roderick Murchison at

the opening of the Geological section last year, should be selected for this scientific labour, not only with regard to Mauritius itself, but also with respect to its other dependencies, as the Seychelles group, the Ile de Rodrigues, &c. By this means we should obtain the systematic geology of these islands, and in the place of the antiquated science of the last century, and different short notices scattered here and there in scientific journals and books of travels, there would be a clear and concise system of the whole. Were a Flora of Mauritius superadded to this, these interesting islands would be as worthily represented in their botany and geology as they deserve to be. The *Hortus Maurititanus* of the late Professor Bojer, is an excellent work of its kind, but a Flora for Mauritius is required, like the *Flora Capensis* of Harvey, the *Flora Zeylanica* of Thwaites, or the excellent *Flora Honkongiensis* of Bentham. Abundant materials exist in the colony, and there are scientific men there capable of producing such a Flora.

The island, like those around it, owes its origin to volcanic action in remote ages, and to the incessant labours of the coral insect. In every part the remains of extinct craters testify to the violent action of volcanic force, a force still existing at Bourbon in its active volcano. It has been asserted by some scientific men that Mauritius and Bourbon were formerly united, and that a submarine communication still exists. Between the south-west part of the island and Bourbon there is a remarkable identity, the same, in fact, that one notices in the formation of England and France, which have been separated by the Straits of Dover. The Basaltic mass of the Baie du Cap, and the huge contracted form of the Moire Brabant in the Savanne, remarkable both for the singularity of its appearance and the peculiarity of its situation, being partly in the sea and partly on a beach of coralline detritus, and rising to the height of 2,000 feet, would seem to confirm this fact. Various chains of mountains, rugged and broken, and seared by the burning pressure of the lava-floods of ancient days, intersect the island; the most peculiar is that of the Pieter Booth, so named after a Dutch admiral who was shipwrecked near the coast, and which forms a striking back ground to the town of Port Louis. The height of this mountain is 2,530 feet.

Rising from the sea to the centre, like a truncated cone, serrated in peaks of every form, nothing can exceed the picturesqueness of Mauritius, and certainly no island can surpass it for beauty of scenery; its miles and miles of verdant cane fields, undulating in the south-east breeze, the plumes of the cocoa palms, the feathery forms of the various acacia tribes, and the glorious "Flamboyant," the *Poinciana Regia*, originally from Madagascar, where it is known by the name of "l'annou," with its vivid green leaves and brilliant red masses of flowers; the darker leaves of the different mango and tamarind trees, all tend to increase the richness of the landscape. Then in the interior of the island, what beautiful waterfalls; the cascade of Plaines Wilhems, with its fall of waters from the height of 180 feet, surrounded with *vaccona* and *bois noir* trees (*Pandanus utilis* and *Mimosa (Acacia) Lebbek*); the falls of the Chamarel, from a height of more than 400 feet, separated into two just before its descent by a large mass of rock, surrounded with tree ferns glittering in the spray, and frowned upon by the Piton de la Rivière Noire, the highest point in the island, being 2,950 feet above the sea level; the falls of the Tamarin River, foaming over its five ledges of basalt, and rolling on to the sea through a woody ravine of nearly 300 feet deep; all these and other spots have won for Mauritius the well-deserved name of the pearl of the Indian Ocean. I may here particularise the peculiarly beautiful blue of the sky above Mauritius, which looked up to through the clear and brilliant air, gives the greatest idea of distance I have ever seen, and equals what Euripides says of the clear blue skies of Greece. ("Medea," v. 809, &c.) I regret I have no space to refer further to the geology of the island, or to the peculiar coral belts that surround it; I would allude, however, to the still excellent work on that subject by M.

Bory de St. Vincent (*Voyage aux Iles d'Afrique*), and to the admirable investigations of Darwin in the geological portion of the voyage of the *Beagle*, the "Journal of a Naturalist," and in the "Specific Work on Coral Reefs, &c.," to Captain Carmichael's truthful notice ("Hooker's Bot. Miscel.," ii. p. 301), and to Colonel Lloyd's account ("Geol. Trans.," iii. p. 317). I may also mention that Dr. Ayres has given a short geological account of Flat Island, which will be found at p. 220 of the "Transactions of the Royal Society of Arts and Sciences, Mauritius, 1860," going over the same ground that Dr. Desnoyer had already illustrated.

As to the Flora of Mauritius, this island, together with Bourbon and Madagascar, have been considered as belonging to the African alliance by their geographical position; yet they differ materially from the Flora of Africa, and more assume the peculiarities of the Indian Archipelago, from which they are separated by widely extended seas. But the tropical position of Mauritius at once determines its vegetation, though the late Professor Bojer, who examined the coast of Mozambique and Zanzibar, found there many plants the same as those in Mauritius, though there are some genera peculiar to Mauritius. All the valuable plants and trees, however, that grow in the Indian Archipelago succeed equally well in Mauritius. I may here mention that the coco-de-mer (the double cocoa-nut) (*Lodoicea Seychellarum*), so long a botanical mystery, though it flourishes so well on its solitary spot, the little Ile Praslin, of the Seychelles group, does not succeed well in Mauritius; and the same may be said of the mangostan (*Garcinia Mangostana*), though it thrives nearly as well in Bourbon as in its native Moluccas. In the Botanical Garden of the island, the spice tribes, introduced with so much care and trouble by that celebrated man, M. Poivre, and cultivated so assiduously by M. Céré, (but which are now no longer extensively grown there), as well as every variety of tropical plants are to be found. Its director, Mr. Duncan, has sent a small collection of fibres to the International Exhibition. But every class of fibre-producing plants may be found in the island; and were this speciality, with that of cotton cultivation (for Mauritius and Bourbon were once celebrated for their cotton), to be introduced into the dependencies of Mauritius, so perfectly suited to their growth, those dependencies might be rescued from their present abject state. In a commercial point of view, I may mention that the *Pandanus* class, *P. utilis*, *P. odoratissimus*, and *P. sativus*, from the leaves of which the sugar-bags are made; the various kinds of *Bromelia*, *Agave*, and *Sansevieria*, the *Musa* tribe, particularly the *M. textilis* and the *Urania speciosa*, from whose fibres so excellent a cloth can be made; the *Corchorus* tribe, the various kinds of the *Hibiscus* and *Asclepiadaceæ* families, as well as the *Urticaceæ*, all which grow in abundance; but up to the present time, with the exception of the leaves of the *Pandanus*, they are turned to no useful purpose. Of the sugar-cane I will speak further on. As to the woods, a gentleman has sent a small selection to the Exhibition. In the colony flourish the teak (*Tectonia grandis*), the Bois de Natte (*Mimusops*) of various kinds, one kind of which (*M. imbricata*) grows 60 feet high, and is an excellent wood for furniture making; the different kinds of ebony (*Diospyros*), for which Mauritius was formerly celebrated; the two kinds of tacamaka, the red and white (*Calophyllum*), the iron-wood (*Stadmannia Sideroxylon*), the *Mauritiana fetida*, the stinking wood, which, on account of its extremely disagreeable smell, the white ants will not attack, and it is therefore used as the foundations of houses. Other kinds, excellent for building and furniture purposes are also found. The oil-producing and the dye-producing plants are also numerous, and various medicinal plants flourish in the island, an account of which has been published by that excellent botanist, the Secretary of the Royal Society of Arts and Sciences, M. Bouton, in his work, "*Plantes Médicinales de Maurice*, 1857." The vanilla (*V. aromatica*), which grows admirably in Mauri-

tius, and for specimens of which a medal was granted at the Paris Exhibition of 1855, is not cultivated to the profitable extent it might be, and which is so effectively done in the neighbouring island of Bourbon. But I must stay no longer on this portion of my subject, which, from its great utility, deserves an especial notice. I may mention that Mauritius is extremely rich in orchids and tree ferns, some indigenous to the island. Coffee of a very superior kind was formerly cultivated, and indigo also; but of late years the cane-culture has entirely prevailed; the destruction done by the hurricanes was also a reason for abandoning the growth of coffee, though a very large quantity is consumed in the colony, as I shall elsewhere mention. A very excellent kind of tea was grown a few years ago; but it was on too limited a scale to be commercially profitable, and the idea was abandoned.

The zoology, ornithology, ichthyology, and entomology of the Mauritius have been little studied of late years; more attention has been given to its conchology, of which some excellent and extensive collections exist in the cabinets of private individuals. The ornithology of the island is not extensive, nor is the zoology, though some interesting points are to be found in both these branches. A catalogue of the animals of the colony was attempted by that zealous naturalist, and patriotic Mauritian, the late M. Julien Des Jardins, assisted by M. Guérin Méneville, and a few notices are found in the "Transactions of the Society of Arts and Sciences;" the same may be said of the insects, of which M. Des Jardins has published a collection, and a few are to be found in the *Catalogue des Coléoptères* of Count De Jean. Of the fishes, many are excellent for eating, particularly the goromy (*Osphroenus olfax*), introduced from China; the rock cod, mullet, &c.; and many of them are particularly beautiful, though poisonous, of striped and variegated colours, and seen to great advantage when darting through the coral forests in the deep blue sea. Of the birds, the most interesting have been introduced from other countries; the guinea fowl are abundant; quails, partridges, of which there are two species, one like the common partridge of England, the other with spotted plumage (*Tetrao Madagascariensis*). The martin (*Gracula tristis*), introduced from the Malaccas to devour the locusts, which at one time infested the island, is an amusing bird, a great mimic, and a favourite with the Creoles. The Tropic Bird (*Phaeton Ætherius*), and various kinds of parrots, &c., are to be found. Among the lizard tribe, also, there are some very beautiful. I would particularly mention the Geeko (*G. Heliotropica*), about seven inches long, of a brilliant green colour speckled with faint crimson; the belly, a fawnish yellow, a line of azure traversing each eye and along the neck and shoulders, a triangular spot of the same colour edged with crimson over the nose. The eyes are particularly vivid, and when this lizard is seen on the leaves of the *Pandanus*, nothing can be more beautiful. For the history of the Dodo and the Solitaire, birds now quite extinct, but formerly abundant in Mauritius and the Island of Rodrigues, I beg to refer to the admirable monograph on the Dodo and the Solitaire by the late Mr. Strickland; though I may mention, *en passant*, that last year a few bones of the Solitaire were sent to England by Mr. Bounton, Secretary of the Royal Society of Arts and Sciences, which I had the honour of presenting to Professor Owen. The Aye-Aye (*Cheiromys Madagascariensis*), of which a very interesting account was published in the Colony, in 1860, by Dr. Sandwith, and of which an elaborate scientific description has been lately read by Professor Owen before the Zoological Society, is brought from time to time to Mauritius, where it lives as well as in its native place. Among the shells of Mauritius there are some very fine, though many of them being inhabitants of the deep sea, are difficult to obtain. The Lepus, the Admiral, the *Cypræa nappa*, or Map-shell, the double Harp (*Harpa nobilis*), are beautiful shells, while one species of *Melania* (*M. setosa*), is of great rarity,

being crowned with vaulted spines, each of which incloses two or three setaceous bristles. My space precludes me from any further detail on this point.

CLIMATE, METEOROLOGY.

Though situated within the tropics, Mauritius is not subject to the burning heat which is experienced in India and elsewhere, and at certain periods of the year, from the end of April to October, the climate is delicious. The south-east wind which blows during a considerable portion of the year imparts an agreeable coolness to the air. There are simply two seasons, from the middle of October to the middle of April, the summer; and from the middle of April to the middle of October, the winter (cool) season. The south-east wind blows fresh and is always dry, it rises generally about 8 a.m., and is replaced during the evening, and at night by the land breeze. The north-east wind is generally rainy; it is this wind which blows during the heaviest rains in the months of January, February, and March, if it blows in the other months of the year it only brings slight showers. The north is rainy; the north-west, west, and south-west winds are sometimes accompanied by rain, more frequently in the hot season; these winds are scorching and unhealthy, and their effect on vegetation is to burn the leaves as if fire had passed over them. With regard to the barometer and thermometer, I may remark, from a series of observations of my own over a number of years, and compared with those of Captain Stokes, R.E., the Government Observer, and with those of Professor Meldrum, of the Observatory of Port Louis, and of the Meteorological Society of the colony, for the modern observations, and with those of M. Lislet Geoffery, M. Labutte, and M. Julien Des Jardins for those anterior to my own, the highest indication of the barometer during the year, was 30.50, the mean of highest indication was 30.25; the lowest indication (excepting during a hurricane) was 29.80; the mean of lowest indications was 29.86; the highest indication of the thermometer (F.) was 91; the mean of highest indications was 77.75; the lowest indication was 67, and the mean of lowest indications was 70. These observations were taken indoors, about 80 feet above the level of the sea. The depressions of the barometer took place at or about, generally just before, the phases of the moon. The mercury in the barometer rises a little before 9 a.m., and falls a little after 3 p.m. These movements are generally very slight between 8.30 and 10 a.m., and between 2.30 and 4 p.m., and at these periods the barometer, if not closely watched, might be considered stationary. At midday, and at 6 p.m., the indications of the barometer give an average height little different from those at 6 a.m.; a second maximum may be observed about 9 p.m. The movement of the barometer is very regular; there are comparatively few days in the year when the diurnal oscillatory movement does not occur at the regular hours.

Mauritius lies in the hurricane track, and the colony has been visited with many severe ones, the most remarkable being those of 1784, 1818, 1819, and 1824. A very severe storm took place at the beginning of last year which did considerable mischief to the sugar canes, and which is minutely recorded by Professor Meldrum, whose observations on the meteorology of the Indian Ocean do very great credit to the scientific society to which he belongs. These cyclones are really caused by the obstacles the trade winds meet in their ordinary course, by the variations the atmosphere experiences in the hurricane season (January, February, and part of March), when the equilibrium of the south-east trade-winds is disturbed. These hurricanes always commence from south-east and east, and as soon as the wind veers to north, that is in proportion as the equilibrium is established and the current of air is exhausted, the violence of the cyclone diminishes, and a lull takes place when it has passed south. These hurricanes are

preceded by intolerable heat and calms, and the atmosphere is charged with heavy dense vapours; the glowing description which Bernardin St. Pierre gives, in his "Paul et Virginie," of one of these fearful disturbances of atmospheric equilibrium, is hardly exaggerated. The barometer is an infallible guide. It strikes me, however, that the hurricane-track is slightly altering so far as Mauritius is concerned.

SOCIAL AND POLITICAL STATE, &c.

Mauritius holds a very high intellectual position; the forms of life, in Port Louis particularly, are as elegant and polished as in Paris or London. Schools of every kind, private and governmental, are to be found in every district of the island. The Royal College is the chief establishment; it is governed by a rector and a staff of English and French professors, and the colony very liberally grants £200 per annum, for four years, to the two best students of the year, to enable them to finish their education in Europe, and embrace a profession, law or medicine generally. Some of these young students take high honours in England, though competing with Englishmen. The Royal Society of Arts and Sciences is well-known to the scientific world; and the Meteorological Society is earning for itself an honourable position. In November, 1859, the Young Men's Association was formed, under the auspices of the Bishop of Mauritius, and lectures on different subjects, by the young men themselves, have been given which would do credit to an institution of the kind in England. In a tropical climate, and in a small colony like Mauritius, this is highly creditable; it tends to show the vigour of the Anglo-Saxon race, though I may observe that some of the most successful lecturers are Creoles of the colony, Anglo-Saxon in thought and education, if not in the fact of family connection. I may notice here that Mauritius has been in possession of England since 1810; yet French is the dominant language of the place. The Catholic and Protestant populations have their respective bishops and clergy, though the Protestants are comparatively few when compared with the Catholics. The government is carried on by a council composed of official and unofficial members; and the colony is now rising into municipal life, and manages its own local affairs by means of a mayor and councillors. Such institutions are certainly beset with difficulties in mixed colonies; and on this subject his Excellency Governor Stevenson has remarked:—"The community in its English, French, Creole, African, and Asiatic varieties, is too mixed, and the Creole population have been too long accustomed to the old regime of dependence on government, to render any such great change (free and liberal government) at all advisable at present; and their tastes, habits and predilections are not sufficiently English to enable them thoroughly to understand and appreciate what English people know and admire as 'free institutions' and 'free constitutions'; and whatever opinions certain sections of the community may express to the contrary, I am satisfied that a sudden introduction of a free constitution into this colony would jeopardise all the institutions, and render them open to great, although, perhaps, unintended, abuse." (Report to the Duke of Newcastle, August, 1860. Blue Book, 1861, p. 108.)

Omitting the Indian population, the creole population always intelligent, has made vast progress in education and liberal ideas during the last few years. No greater proof of this can be shown than the eagerness they manifest for the education of their children. The press in the colony has also immeasurably risen beyond what it was a few years ago, and some of the papers published in Port Louis are quite equal to those published in our own country towns; in statistical information they are decidedly superior; for few country newspapers in England can boast such carefully digested statistical *comptes rendus* of their local affairs as are to be found in the pages of the *Commercial Gazette* of Mauritius. The banks which are established in the colony, the insurance companies, the dock and other estab-

lishments, all of which exemplify the zeal and energy of the community, and all of which pay good dividends, prove that the Mauritius of to-day is not the Mauritius of a few years back, and that since the abolition of slavery, in 1833, the colony has expanded into a freer and better existence. Mauritius must now be judged by the present, and not by the past.

IMMIGRATION, &c., POPULATION, RAILWAYS.

As I said at the commencement of this paper, Mauritius has fairly solved the problem of Coolie Immigration, and it has solved it in a manner to show what a vast benefit this has proved to that race, while at the same time it has been of incalculable advantage to the colony itself. Nothing can be a clearer refutation of the calumnies which have surged up from time to time against the colony on this point, than the history of this immigration. Its value, however, is demonstrated by its success, for any one who will read the various reports on the question with an unprejudiced mind, will come to the inevitable conclusion that the Coolie labourer in Mauritius is better paid, better cared for, and better off at the end of his period of service than the common farm labourers in England. I cannot go into this subject now; but I beg to prefer to such documents as the reports of Mr. Beyts, the first of which, curiously enough, is not inserted in the last Blue Book for the colony, and the reports of Mr. Stipendary Magistrate Ogilvy. In 1859, the new system of immigration was introduced. Engagements with Coolie labourers before this period were made in the colony and its limits alone; then the planters had the privilege of engaging them in India itself, such engagements being made through the Government agency in India. The Indian labourer is now engaged for three years, to remain five years optionally. In the convention which the English Government has made with France for the introduction of Indian labourers into French colonies, the term of service has been made for five years positively; in other words, the foreign colony in which the Indian labourer has never, or rarely been tried, has been at once placed upon a superior footing, in comparison with a colony of the British Crown, which, of all colonies, knows more of the working of immigration, so far as the Coolie is concerned, and which owes to it its present almost perfect condition. What is good for the Island of Réunion is surely equally good for Mauritius; the planters are, therefore, endeavouring, and justly, to have the same advantage, so that the period of service of Indian labourers should be five years. To deny this right would be illogical; to refuse it would be unjust. I may notice that on account of the representations made to the Indian Government, the immigration to Mauritius was suspended in 1838; the prosperity of the colony at once declined. This immigration was renewed in 1842, and Mauritius since that period has gone on increasing in commercial prosperity year by year. At the end of 1859 the general population was 96,526

The immigrant population...	201,979
Aliens, Chinese, &c.	6,541
Total	305,046

By the census of April 8, 1861, the figures stand thus: The whole population was 308,335; of this two-thirds, or 215,968, were Indian.

During the decennial period from 1851 the population had increased by 127,512. The above figures do not include the military, naval, and sailor population, which if added, raises the general total to 311,747; this would give about the proportion of 1.55 inhabitant per acre. The population of the chief town, Port Louis, was, with its environs, 74,111; and four of the districts, Pamplémousses, Flacq, Grand Port, and Plaines Wilhems, numbered respectively 55,598, 41,468, 35,564, 28,020. The proportion of the sexes presents the following variation per cent. in the decennial period:—

	1851.	1861.
Males	66.02	65.45
Females	33.97	34.55
	100.00	100.00

It will be seen, therefore, how large an item is the Indian population, which is one of comparatively modern growth. This will be made clearer by the following statement:—The number of Indians in the colony on the 31st December, 1842, was—males, 18,105; females, 888. In 1852 the numbers were—males, 80,727; females, 19,478; and from 1854 to the end of 1860, the numbers introduced were—males, 91,643; females, 29,719; children, 16,622; making a total of 137,984. The number that returned to India during that period may be assumed at—males, 28,026; females, 5,532; making a total of 33,558. In 1861 the immigration movement was:—

	Male.	Female.	Children.
Introduced...	7,917	2,708	1,475
Left	1,638	317	203

Increase of Immigrant Population during the Year	6,279	2,391	1,272
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The proportion of females in this immigration has been augmented every year, and the prosperity of the body of immigrants is evidenced by two results—the numbers that prefer to remain in the colony when their term of service expires, and their accounts in the savings' banks, and the sums of money they accumulate and take back with them to India. The proximity to India, and the facility of obtaining Coolie labour is a purely accidental circumstance of position in favour of Mauritius, which is more fortunate than the West Indies in this simple geographical combination. But the prestige in favour of Mauritius is not the result of accident—it is the positive consequence of the treatment the Coolies receive there, the excellent wages they obtain, the deference which is shown to their peculiar religious and social feelings, and the certainty that the power of the law is entirely on their side, and that when their period of service is over they are free men to stay or return, and if they do elect to stay, they are free men still in the fullest sense of the term, freer far than they are in their native India—men, not pariahs. This is a point on which I have thought it worth while to insist; for there have been so many myths recorded of Mauritius and its Indian labourers, that I think the opinion of one who knows them well, and who knows the colony equally well, though he has not one atom of interest in any sugar estate, or any commercial establishment in the island, may be considered worth something, as being at least an unbiassed one, and derived *ex re, non a rerum simulatione*, which is too often the case.

With regard to the mortality of the colony, I have no satisfactory statistics for the different quarters, but for the town of Port Louis, the chief town, the case is different. According to the census of 1851, the population of Port Louis was 49,509; by the census of the 8th April, 1861, it had risen to 74,111. From that time to the middle of 1861, the following are the results:—

Year.	Deaths.	Mortality per Cent.
1852	2,056	4.02
1853	2,217	4.22
1854*	6,156	11.40
1855	2,702	4.82
1856*	4,628	7.91
1857	2,263	3.70
1858	2,688	4.04
1859	3,179	4.64
1860	3,672	5.03
1861†	2,155	4.98

* In these years the cholera prevailed. † Seven months.

So largely increasing a population naturally led to the idea of introducing into the colony that great element of civilisation and commercial prosperity—railways. It was in 1855 that this idea first substantially originated with the writer of this paper and an influential inhabitant of Mauritius, who then happened to be in England. The question was warmly discussed, argued and re-argued in the colony for the space of three years, until it at length assumed so tangible a shape that railways became an actuality. A sum of money was voted for a preliminary survey; an eminent engineer, Mr. Longridge, and a small staff, were selected by the Secretary of State for the Colonies, and left England for the Mauritius in May, 1858. That gentleman published an excellent report of his survey, and a valuable appendix. Two lines of railway, the Northern and the Midland, were decided upon, and after many delays—a *sine qua non* in everything colonial—the money was voted, amounting to nearly a million and a quarter sterling, and it was determined to issue debentures at six per cent. to meet a considerable portion of that sum, government advancing £200,000 out of its surplus revenues, which at the end of 1861 had reached the large balance of £500,000. The contract was given to Messrs. Brassey and Co., and Mr. Longridge as their engineer; the railway staff are now in the colony, and the works are to be commenced at once.

PRISONS.

I have left myself no space to speak of the hospitals, and but little of the prisons, both of which are ably managed. Of the prisons I have no official notice beyond 1859, when the number of prisoners on the roll of the prisons was 7,160, a portion (454) remaining at the end of 1858, and the remainder, 6,703, admitted during the year. The number of committals in this year showed over the preceding year an increase of 763, or 7·78 per cent., though there was a decrease of 60 per cent. as compared with 1857. The committals for vagrancy and desertion of service, those unfortunate items in immigrational life, were still large, though on a decreasing ratio, being in:—

1857	4,546
1858	2,687
1859	2,444

The number of committals, if compared with the population, is very small, averaging four cases daily. As to the more serious, or felonious cases, in the English acceptance of the term, the average of 1859 was an improvement over former years, being—

	Total charged.	Convictions.	Acquittals.
1857	93	49	44
1858	67	33	29
1859	76	39	36

The receipts and expenditure for prisons and prisoners were as follows:—

Expenditure	£5,855
Receipts	1,696

Excess of expenditure £4,179

This gives a yearly expense for each prisoner of £8 18s., or about 43d. per day. A reformatory, and an institution for juvenile offenders, are still desiderata. At the present day, these are such important aids of prison discipline, that it is to be hoped they will be no longer delayed.

COMMERCE, REVENUE, &c.

The commerce of Mauritius is a satisfactory topic; though immigration has done much, it has not done all; the energy and perseverance of the planters have co-operated with this powerful element of success. From the moment they saw that free trade—that necessary and logical deduction from the commercial policy of England—was inevitable, they determined to meet the struggle in the only way in which it ought to be met, or, in fact, could be successfully met; that was, by the introduction of the best machinery, by availing themselves of every

invention, by superior manipulation, by more scientific processes, by an enormous importation of guano, and by a rigid economy in the administration of their estates. The result has been, what it ever will be, when similar modes of action are introduced into any system—a great success, only wanting one thing to make that success complete—the removal, or modification of an obsolete, and to my mind, an unjust, fiscal arrangement—the differential sugar duties. A few figures will make this more clear by a comparison of periods:—The exportation of sugar was in—

Years.	Lbs.	Receipts.	Expenditure.	
1820 ...	15,524,755...	£102,875...	£135,433...	£32,558
1825 ...	21,739,766...	141,167...	178,003...	36,836
1830 ...	67,926,692...	164,542...	153,382...	11,160
1840 ...	82,048,509...	243,955...	181,058...	62,897
1845 ...	87,334,312...	296,828...	280,011...	16,817
1850 ...	110,937,388...	308,550...	265,747...	42,803
1855 ...	253,892,673...	348,452...	317,839...	30,613
1859 ...	247,948,302...	609,517...	572,479...	37,038
1860 ...	281,256,452...	553,419...	500,853...	52,556
1861* ...	257,600,000...	349,925...	289,632...	60,273

* Nine months to 30th September.

The crop of 1860-61 was estimated at 150,000 tons, but the ravages of the borer reduced it by at least 20,000 tons. As sugars pay an export duty of 5s. per ton, this alone caused a revenue loss of £5,000. There has of late years been a very large falling off in the revenue from spirituous liquors, nearly £20,000. Mr. Governor Stevenson alludes to this as far back as 1859, and attributes the falling off to illicit distillation, and frauds on the revenue. By the Board of Trade returns for the year 1861, the figures for Mauritius sugars were—

IMPORTED.			
	1860.		1861.
2nd quality..... cwt.	636,243	.....	886,430
3rd " " " "	513,433	.....	605,439
Total	1,149,676	.....	1,491,869

ENTERED FOR HOME CONSUMPTION.

	1860.		1861.
2nd quality. cwt.	500,374	.....	987,521
3rd " " " "	428,452	.....	531,587
Total	928,826	.....	1,519,108

The average consumption of coffee in Mauritius, during the last three years, has been 1,200,000 lbs.; the average consumption per head per annum is—

In France	about 1½ lb.
England	" 1½ "
Mauritius	" 3 "

The total value of the import trade of the colony at the end of 1860, amounted to £2,769,209, and that of the export trade to £2,259,639. The declared value of the exports from the United Kingdom to Mauritius was—

In 1860.	In 1861.
£538,303	£551,797

The planters expended alone in mill-machinery, guano, and mules imported, the following sums in the following years:—

	1857.	1858.	1859.
Machinery ...	£76,080	£92,298	£81,204
Guano	24,290	109,759	98,973
Mules	43,040	35,444	29,569

According to the last reports for the year ending March 31st, 1861, the colonial military expenditure of Mauritius, for 1,630 officers and men, &c., cost England £145,558, of which sum Mauritius contributed £25,354. I cannot enter into this colonial military expenditure question here; it has been amply discussed of late years, and lately in the able pamphlet of the Right Hon. C. B. Adderley, M.P., in his letter to the Right Hon. B. Disraeli, M.P. The motion

of Mr. A. Mills and the discussion on it in Parliament, on Tuesday week, have not added anything to our previous knowledge. It is rather too much, however, to advance the argument of mere self-government as the basis of making the colonies support their own defences; nor can it be said that the military are kept in the colonies alone for preserving their internal order and security. In Mauritius they do nothing of the kind, and their duties in this respect are light indeed. In colonies like Australia, Canada, &c., the argument might be valid, but certainly not in Mauritius. Nor would Mr. Adderley object to the sum of £15,000 for the completion of the fortifications in Mauritius, as he did on the 6th inst., were the importance of Mauritius as a military point in the Indian Ocean considered; and were he to remember that Bourbon Island is also a very commanding position. Anyhow, our Indian commerce *via* the Cape is worth protecting; Mauritius has two admirable harbours, and could do this in an emergency. Our merchants suffered too much at the beginning of the present century, from the losses inflicted upon them by the cruisers from the Ile de France, to ever risk such an alternative again.

THE BORER.

As I have previously mentioned, the "Borer-insect" has for several years past done considerable mischief to the cane plantations, and the evil is increasing. In 1855, a committee was appointed by the then governor, Sir James Higginson, and a valuable report, with drawings of the insects appended, was drawn up by the celebrated botanist, the late Professor Bojer. He fancied it to be a new insect, and named it *Proceras sacchariphagus*. The author of this paper, however, showed that it was no new insect, but the *Diatraea sacchari* (the *Phalana Saccharalis*), (see Westwood's "Mod. Classif. of Insects, ii. 411), which the Rev. L. Guilding so well described, and for his essay on which he received the gold medal offered by the Society of Arts. (Transact. Soc. Arts, xlii., 143.) The ravages by the caterpillar of this moth have been almost as destructive in the Mauritius as in the West Indies. The Chamber of Agriculture offered a reward of £2,000 for a remedy. Every remedy under the sun was at once brought forward, some outrageously ridiculous, as theoretical remedies generally are. The writer of these lines exhorted the planters in 1855 to destroy by fire those canes on which the borer was then only beginning; the remedy was not adopted. The evil is now a serious one; it has extended also to the sister island of Réunion (Bourbon). As yet no remedy has been discovered. Any suggestions, however, from practical men on this point would be received as a boon by the colony; and if this paper can be the means of obtaining them, the writer will consider himself happy in being able to contribute in the smallest degree to so desirable an object.

DIFFERENTIAL DUTIES.

I will allude to this point, one of vital importance to Mauritius, not in a political, but simply in a commercial spirit. If free trade be what I firmly believe it is, a positive advantage to the whole community, then the principles of free trade should, one and all, be carried out in their fullest logical extent, and not by any piece-meal selection of some of its conclusions, and the rejection of others to suit a financial contingency. I cannot introduce this subject better than by an extract from the Budget speech of Mr. Disraeli, then Chancellor of the Exchequer, in 1852. After comparing the entries for home consumption of Foreign and British sugar for the first ten months of 1851 and 1852, he said:—"It may be said that these are merely figures, but I beg to observe that in this instance figures constitute the case. This is a question of figures, and the result of the figures I have quoted is, that there being in 1851 4,126,000 cwt. of British sugar against 1,487,000 cwt. of foreign, in 1852 there were 5,378,000 cwt. of British against only 814,000 cwt. of foreign. In other words, British production has increased by 1,250,000 cwt. I may be called a traitor. I may be called a rene-

gade, but I want to know whether there is any gentleman in this House, wherever he may sit, who would recommend a differential duty to prop up a prostrate industry which is actually commanding the metropolitan market." It is not for the figures but for the last phrase, so conclusive, that I quote this speech; for it proves that competition is better than monopoly of every kind, and at the very time that certain parties were prophesying that the admission of slave-grown sugar to compete with British sugar would be the ruin of the British Colonies,—the British Colonies actually produced more than during the period of their monopoly. The West Indies and Mauritius will prove this, and be quite sufficient for my argument:—

WEST INDIES.		Cwts.
Average of five years ending July 1846	.....	2,708,730
" " " " 1851	.....	2,821,204
Increase		118,474
MAURITIUS.		Cwts.
Same periods	1846	674,256
"	1851	950,163
Increase		275,907

I denominate the differential duties, as at present constituted, monopolies in favour of the English refiner, and as such, a protectionist tariff in the midst of the flourishing results of free trade. When Government declared the assimilation of the duties on sugars, whether from free or slave labour, the colonies were told to gird themselves for the struggle, to adopt better modes of manufacture, to import more improved machinery, and prepare a better article for the markets of the metropolis. They did so; but the differential duties, in their four unhappy divisions, carried by the Chancellor of the Exchequer (Mr. Gladstone) in 1854, immediately neutralised their efforts (I am only speaking of Mauritius), and the superior sugar made from the same raw material, and which this improved machinery, &c., enabled the planter to produce, had a *high* duty levied on it, while the inferior kind had a *low* duty levied on it. The value of improved processes was therefore an absurdity; the subdivision of duties immediately gave a premium to bad manufacture, and discouraged improvement. This will appear clearer from the following statement, which will show, I flatter myself, how the relations of sugar-value to the grower are capriciously disturbed, how these values become artificial, and how the consumer is taxed in a necessary article of his daily consumption in the very ratio of the improvement of such article. These differential duties at present existing are as follows:—Refined, 18s. 4d; white clayed, 16s.; brown clayed, 13s. 10d.; not equal to brown clayed, 12s. 8d.; molasses, 5s. per cwt. Such nice distinctions may be called the metaphysics of sugar taxation. Now see the result. Were these different kinds of sugars marked by broad distinctions of colour, crystallization, &c., they could then be easily estimated; but when near equalities, and very slight surpassings of these standards by a small amount of value occur, instead of a duty of 12s. 8d. the 13s. 10d. duty comes into operation, though the buyer will offer the same price for both, so that the extra duty, which goes for nothing in the real value of the sugar, absolutely gives a greater nett value to the 12s. 8d. taxed sugar than to the 13s. 10d. From a duty of 13s. 10d., there is a sudden rise to 16s., on the product of the identical sugar cane perhaps. Here the home sugar refiners have a monopoly, and this arbitrary leap of 2s. 2d. per cwt. excludes the best sugars from the English market, and consequently is an injustice to the producer, and a wrong to the consumer, for though these sugars are really more valuable, and pay the higher duty of 16s., they do not produce in the market more than 6d., 9d., or 1s., above the inferior kinds paying the 13s. 10d. duty. The consequence is vexation to the purchasers, who

never perfectly know under what category of duties their sugars will fall, until the duty is fixed upon them; the finer qualities of Mauritian produce, therefore, go to France and Australia, where the tariff is more liberal.

While on this point, I beg to call attention to a valuable report of the Chamber of Agriculture in Mauritius, drawn up by practical men, and published on the 12th November, 1861. I have had this report reprinted, and it is at the service of any gentlemen, as the greatest publicity and the greatest discussion are, in my estimation, the surest safeguards of truth, whether political or commercial. From that report I will extract two passages:—"What can be more arbitrary and more uncertain than the principle of an *ad valorem* duty dependent on the colour of a sugar. How can the just limit be established between the colour which is to pay one and the colour which is to pay the other duty? The Custom House officer is thus left the sole arbiter to fix the duty. One officer in cloudy weather will class the same sugar differently from his colleague, who will examine it in sunshine. Two parcels of the same quality will be taxed 16s. in London, and 13s. 10d. in Liverpool. This happens frequently. What is remarkable is, that the better the sugar, the greater the uncertainty, the doubt, the error, and the contradiction of the classification." "The example of France ought to inspire the Government with confidence, and enlighten it in this respect. Need we mention that the refineries of Paris, Havre, Nantes, Bordeaux, and Marseilles, are in full prosperity under a legislature which divides sugar into two classes only. The Committee go still further, and think that the British refiner himself would gain by a change in accordance with the system adopted in France; at the present time he cannot procure the raw material so cheap as the French refiner, as the latter purchases in this colony the finest sugars, which pay 16s. duty in England, at the same price as the British refiner pays for inferior quality which pays 13s. 10d. in England." The sugars which Mauritius has sent to the International Exhibition will be a proof of the unfairness of the system, and will show that the duty excludes the best sugars, because they are the best, from the English market; and thus, besides being a premium on bad manipulation, is an obstacle to the improvements in machinery; for what is really the use of improvement when the improved article becomes a disadvantage to the employer of the improvement? What Lord Mansfield long ago said of the Insurance laws, applies equally well to the differential sugar duties. "The property and daily negotiations of merchants ought not to depend upon subtleties and niceties, but upon rules easily learned and easily retained."

Mauritius does not ask for any protection—for any favour; it simply asks that the principles of free trade should be carried out; that an illogical tariff should be modified, not abolished. It asks for the establishment of a fixed rate of duty at the lowest scale consistent with the interests of the revenue, to be charged on all sugars alike. It is not so much the duty that is vexatious, but the want of uniformity. The revenue might possibly be affected in the single year in which this alteration might be made, but it would undoubtedly be augmented for ever afterwards. The axiom of political economy operates here; reduced duties increase consumption—the collateral branches of revenue prove this; but sugar-history proves it better than any other item of taxation. In 1789 the duty on British Plantation was 12s. 4d. per cwt., and on East Indian, £37 16s. 3d. *ad valorem*; the consumption declined from 81,000 tons to 77,355 tons. In 1790 the duty on British Plantation was raised to 15s., and the consumption fell to 76,811 tons; in 1791 to 70,160 tons; and in 1792 to 68,000 tons. In 1797, when 17s. 6d. duty per cwt. was imposed on British Plantation, and East Indian was taxed with an additional 5s. 2d. per cwt.; consumption at once fell to 63,000 tons, less by 10,000 tons than it had been twenty years before. So for every increase of duty there follows a diminished consumption. To pass from the old to more recent periods—in 1844,

with high duties, the consumption per head was 17lbs.; in 1858, with reduced duties, the consumption per head was 35½lbs. The revenue increased in proportion, and the comfort of the sugar-consuming population was equally augmented. I do not think then that Mauritius requires too much in asking for an equalisation of, and a diminution in, these sugar duties which press upon and impede the expansion of her staple industry. In a year with a Free-trade Ministry in power, and with a Chancellor of the Exchequer who has done more than any statesman to philosophise our Budgets, and to make figures eloquent with a science they never had before, and who has inaugurated an extensive and paying Treaty of Commerce with France; it is not too much for Mauritius to ask that so illogical and so vexatious a system as that of differential duties should be modified and reduced. I trust the Society of Arts will pardon the introduction of such a topic; but to speak of Mauritius, and its commercial history without speaking of these differential duties, appeared to me an abnormal manner of finishing this very meagre and imperfect sketch of an interesting portion of the British Empire. The colonies now are no longer what they were; whether the semi-abandonment theory of the Oxford Professor of History, Mr. Goldwin Smith, be advocated, or whether the wiser views of the Canadian Association, or those of the Duke of Newcastle, so eloquently expressed at the anniversary dinner of the formation of the Australian empire be adopted, certain it is that by her colonies the surpassing greatness of England has been developed, and her mighty power consolidated, that the decay of her population has been checked, and the unity of the nation and the nation's language have been diffused; whether we regard them as dependencies, in the sense of affiliations, or as colonies, in the radical meaning of the term, implying "workers and co-operators" with ourselves, let us regard them as the old Latin races regarded their colonies, with care and affectionate protection, and they will be to us what Cicero emphatically calls them, the *propugnacula imperii*, the bulwarks of an empire whose flag floats over colonial possessions of a magnitude undreamt of by the most ambitious of Greek or Roman conquerors.

It was my intention to have spoken of the dependencies of Mauritius, as the Seychelles, Rodrigues, &c., but I have, I am afraid, too long occupied the attention of my audience. I may mention that these islands, amounting in the aggregate, to more than 50,000 acres, are as yet undeveloped. In all of them cotton would thrive well, and an unbounded supply could be obtained if such an industry could be established in them. But the Seychelles group is improving, though its distance from Mauritius is an impediment to its success. According to the last Blue Book, the population of these dependencies amounted to 8,001. The report of the Commissioners appointed by Mr. Governor Stevenson, to visit the smaller dependencies of Mauritius in 1859, has been added to the Blue Book or the colony, published in 1861.

DISCUSSION.

MR. P. L. SIMMONDS said that the two islands of the Indian Ocean, Mauritius and Ceylon, stood out as exemplifications of the success resulting from an abundant supply of labour; and to them had been transferred much of the enterprise and capital formerly expended in the west on two of the most important staples—sugar and coffee. The progress of sugar cultivation in Mauritius was very striking, and notwithstanding the various crises and difficulties through which the island had passed, but for the oppressive differential duties on sugar to which reference had been so prominently made, it would have made still further progress in its direct trade with England. Owing to the classification of duties, the best of its sugars, those on which the greatest amount of skilful manipulation and careful manufacture had been

bestowed, were sent to the Australian Colonies, the Cape, and the Continent. The importance of the island of Mauritius would be better appreciated from the statement that in population it nearly equals New South Wales or Jamaica, and that its external commerce, imports and exports, exceeds in value $4\frac{1}{2}$ millions sterling, as much as that of the Cape, with its far greater extent of territory and large wool-trade. Unfortunately, in Mauritius, as in Barbados, attention was so exclusively directed to sugar production that little or no attention was given to the cultivation of bread stuffs, and hence the food supplies of rice, live stock, &c., for its large population had to be obtained elsewhere. Great quantities of cattle were obtained from Madagascar, and rice from the Bay of Bengal. With Madagascar, under the *régime* of the new king, it was probable that a trade might be opened up for many raw products which that large and little explored island could supply, as the King took an interest in commerce, and had even forwarded samples of products, through Mauritius, to the International Exhibition. The flourishing condition of the colony of Mauritius was evidenced by the large revenue now raised, which enabled it to apply the surplus to many useful public works, roads, railways, &c., and the revenue raised stood next to that of the Cape and Ceylon. With respect to the tenure of service-engagements, it did seem somewhat strange that an adjoining foreign colony should be allowed to obtain labourers on more favourable and extended periods of service than our own colonists; and the favourable treatment they received in Mauritius was evidenced by the large number who settled there, and the accumulation of their savings in the banks. Thus in 1859, 468 immigrants withdrew £10,151 from the savings bank on returning to India, an average of nearly £22 for each, a large individual sum for this class of labourers. If the dependencies of Mauritius, the Seychelles, were brought into more regular communication by steam service, cotton and very many useful products might be obtained from them, more labour might be thrown into them, and opportunities offered for the shipment of their staples. The Seychelles lay in the direct track of Mauritius and Aden, and ought not to be excluded from the steam service. It was also proposed to connect Natal with Mauritius by steam service, and this would complete the circle of communication by uniting the South African colonies in commerce and communication with it. The visit of her Majesty's steamer *Lynx*, with the Bishop of Mauritius, to the outlying distant dependencies, had resulted in an interesting official report of their condition and capabilities. There was one advantage attending the discussion of papers on our colonies like that read that evening; it diffused more correct information respecting their trade and resources, and made the public at home better acquainted with their value. This was the more important at the present time, when the subject of the cost of the colonies to the mother country, and their capabilities of meeting their own expenses without touching the revenue of the parent-state was being largely debated both in and out of Parliament. Mr. Morris, from his great local experience in the island, and his official connection with it, had been able to furnish a most interesting *résumé* of all its salient features, brought down, too, to the most recent date.

Rear-Admiral Sir EDWARD BELCHER would offer one or two remarks with regard to the fortification of Mauritius. Mr. Morris had rather thrown out the idea that they ought not to expend money on the fortification of that island. He (Sir E. Belcher) was entirely of that opinion, as it would be a thorough waste, except for the purposes for which these fortifications were originally designed, viz. to repress the slave population in the event of insurrection. The island itself required no fortification, being protected from external attack by the coral reefs around it, so that it was impossible for any descent to be made by an enemy upon the coast, unless it were done through the regular channel of navigation, which was narrow and difficult, and could easily be defended by a ship of war—

one of our iron frigates—and this would be cheaper than expending large sums of money upon the shore fortifications of the island. He entirely agreed with all that had been stated in the paper. He should be happy to see some portion of the land now used for cane, and where the borer was committing such havoc, devoted to cotton cultivation. The locality in which that insect made the greatest ravages was on the line where the sea breeze blew upon the canes. Wherever there was a strong breeze, particularly from the sea, upon the sugar canes, there the borer and other insects injured the canes very much, and there also cotton would thrive better than the cane. Some allusion had been made to the Seychelles. He believed those islands would at no distant date form a valuable colony, and he should be glad to see the governor of Mauritius interesting himself in directing more attention to the cultivation of land there—or rather to the reduction of the cultivation of the cocoa nut, which was a great exhauster of the soil. A cocoa nut tree was considered to be worth five dollars a year, and so the owners let those trees stand upon ground which was capable of yielding more valuable produce—at least of more importance to this country. For instance, the land on which these trees grew might be converted into cotton plantations, but it would require labour to cultivate them. It was the want of a supply of labour which prevented the Seychelles from advancing, and so long as indolent people cultivated the cocoa nut for the sake of its fruit, they could not look for any great advancement in those colonies.

The CHAIRMAN felt it was not his province to take up the time of the meeting by remarks of his own. He should like to have heard the opinions of other gentlemen who were intimate with the Mauritius of the present day. He knew it well forty years ago, but it was then a slave colony, and under very different circumstances to those which had been stated that evening. It was one of the most beautiful islands, as regarded climate and soil, that he was acquainted with, and what had been said with respect to the fortifications was correct. Any money spent in the fortification of the island—as that term was understood—would be thrown away. The natural fortifications by reefs and narrow channels were such that it was next to impossible for any hostile force to land with even a sloop of war in the neighbourhood. The Seychelles were an interesting small group of islands which had not hitherto contributed much to the commerce of this country, and with reference to what had fallen from Sir Edward Belcher, he (the Chairman) questioned whether they could induce the people to cut down the cocoa nut trees, which furnished them with meat, drink, and lodging, without the labour of cultivation. In a locality where men were satisfied if they could earn three half-pence or two-pence a day, they could not, under the present circumstances of those islands, expect that cotton cultivation, which involved a great deal of manual labour, would be promoted to any great extent. He would now take the opportunity of proposing a vote of thanks to Mr. Morris for his very able and interesting paper.

The vote of thanks having been passed,

Mr. MORRIS acknowledged the compliment paid to him, and remarked that the object of his paper was to bring before the notice of the British public a colony which, he was sorry to say, was not so well-known as it deserved to be; but the main point in the paper was to induce discussion upon a question which, to his mind, was of the highest importance—the differential duties. There was a great staple produce largely consumed in this country which was most injuriously affected by the operations of our fiscal tariffs. Mauritius did not so much want a reduction of the duties on sugar as an alteration of them. For instance, he had shown that the duty upon this article, which was so largely consumed in this country, was made to be dependent almost entirely upon the result of examination by the Custom-house officer. A certain cargo of sugar was brought into port. It was very possible that the bags

underneath, although precisely the same quality of sugar as those on the top, might, by the pressure upon them, be altered in colour and in the character of the crystallisation, and they would be taxed with a lower duty, whereas the upper bags would be taxed with a higher duty, although they were precisely the same class of sugar. The planters thought it very hard, after the large sums of money they had expended in providing the most improved machinery, that they should be subjected to this capricious system of duties. He would say, without fear of contradiction, that no colony, in proportion to its extent, had expended so much money as the Mauritius, in introducing the best mechanical appliances for the manufacture of sugar, and hence the present system of taxation pressed very heavily and unfairly upon them, because it created a monopoly in favour of the British refiner, for this reason—that he could buy the unrefined sugar at a low rate, whereas, if the cultivators were foolish enough to refine it in the colony, they would have to pay a very heavy duty upon its introduction into our markets. The consequence was, that all classes of manufactured sugars were shut out of the English markets, so that the great bulk of manufactured sugar from the Mauritius found its way to France and Australia, where the tariffs were more favourable. With regard to the fortification of the island, the gentleman who had addressed them on that subject (Sir Edward Belcher) had somewhat misunderstood the purport of his remarks; his paper certainly went to show that Mauritius need not be fortified so as to be capable of resisting the artillery of the present day, for that would be an absurdity. It was also true that the island was defended by natural barriers of rocks and coral reefs, but what he argued was that Mauritius was peculiarly situated, more particularly as this country had given up the Isle of Bourbon, which was only about 100 miles from Mauritius. At the present moment, also, there was another great country coming into the theatre of events, viz., Madagascar. We were led to believe that an alliance would be made between England and Madagascar, and it would be necessary that a sufficient force should be kept somewhere at hand, so as to be prepared for any emergency. We had seen the necessity for preparation against emergency in the late anticipated rupture with America, but owing to the greater distance of Mauritius, we could hardly sent a garrison out with sufficient rapidity, and, therefore, one ought to be maintained there. To go back only to the early part of the present century, our merchant ships were subject to the attacks of hostile cruisers before England could do anything to prevent it, and rich cargoes were despoiled by the ships of the enemy, and this might occur again. His object was to show that Mr. Adley and others were wrong in saying that £15,000, spent in the fortification of Mauritius, ought to be considered as money thrown away. He (Mr. Morris) contended that anything which showed to the minds of the colonists that they were not overlooked or neglected by the mother country, would not be money ill-spent; and, under those circumstances, he differed from the gallant gentleman who had spoken on this subject. With regard to the Seychelles, they were situated some considerable distance from Mauritius, and the inter-communication between the islands was by sailing vessels; but if steam communication were established, he believed cotton cultivation would be more profitable than that of the cocoa nut. The production of oil had been increasing in those colonies, and he saw by a publication of the Cotton Supply Association of Manchester that during the last year 6,720 cwt. of cotton had been received from Mauritius, whilst from the Cape and Natal only about 5,000 cwt. had been received, which showed that the cotton industry was advancing in the island. In the other islands where the cocoa nut plantations were not of sufficient extent to produce oil in remunerative quantity for export, cotton would grow splendidly, because the cotton plant required the sea breezes, and in all these islands the sea breezes were at hand, and cotton would grow to great perfection and of fine quality. It was

no use to think of making these islands sugar colonies, because they were at too great a distance from Mauritius, which was the centre of manufacture. He would therefore suggest that the cotton cultivation might be more successfully prosecuted. With regard to the borer, which made the sugar crop of the last year so deficient in the Mauritius, he could only say, if any gentleman could give information as to the best means of extirpating that ruinous insect, he would not only be conferring a particular favour upon himself personally, but upon the colony at large, and upon the whole sugar-consuming community of England. The insect appeared to be gaining ground, and no remedy hitherto resorted to had been effectual, and the consequences to be apprehended were, that a splendid colony was in danger of being brought to ruin by its ravages.

The Secretary announced that on Wednesday evening next, the 19th inst., a paper by Mr. Robert Rawlinson, C.E., "On the Sewerage of Towns," would be read.

Home Correspondence.

THE TURKISH BATH.

SIR,—I have read with very great pleasure the learned paper of Mr. Urquhart on the Turkish bath, published in the *Journal of the Society of Arts*, and I can bear testimony to the general exactness of his description.

But in regard to the practice observed in the Moorish baths, I may add that women do not make use of soap for cleaning their hair; they substitute for this purpose a soapy stone, called *t'ofel*, dissolved in water. This stone is also employed for washing cloths with gold embroidery upon them. It is probably a species of magnesian salt, or rather an argillaceous stone containing magnesian salt, and is brought to Algiers from the South.

As to the influence of the Turkish and Moorish baths on health, I may say that the French residents in Algeria generally make very little use of this kind of bath, because they find it weakening. Nevertheless, I myself think that they will not produce this effect if persevered in for a considerable time.

The dirtiness of the Moorish baths, and particularly of the natives that are met with in them, contribute much to produce aversion on the part of Europeans.

I am, &c.,
PAUL MADRINIER,
Directeur des Annales d'Agriculture des Colonies.

Paris, March 3, 1862.

THE SILK TRADE AT FLORENCE.

DEAR SIR,—During my visit to Italy in November last, as one of the deputation to report on the Italian Exhibition of 1861, held at Florence, I became acquainted with one of the jurors in the silk department, M. Leopold Maffei, who has justly attained to considerable eminence as an authority on all that concerns that important native industry.

Since my return he has kindly furnished me with some materials for the paper I am announced to read on the 30th of April, which I could not obtain on the spot, amongst which I find a manuscript notice by himself of the former and present condition of the silk trade in Florence specially. Although my friend probably intended that I should incorporate it in my forthcoming report, or rather paper, it contains so much that is really original and interesting, that I think his reputation would be best consulted by the article itself, in all its integrity, appearing in our *Journal*. I therefore enclose a rather free translation of it for that purpose.

I am the more induced to take this course with it by the consideration that I could not, consistently with my

views, indorse all the political and economical speculations in which he indulges, though I might safely subscribe to some of them. Besides which, as they apply only to the comparatively small, though otherwise important, city of Florence as the capital of Tuscany, and as the silks exhibited there last autumn were from all parts of Italy, it would be to give them a prominence to which I hardly think them entitled.

You will observe that M. Maffei points to a mode of special support, viz., association, which, as applied to manufactures, our experience does not encourage, and which sound principles of political economy would altogether discountenance and repudiate, if to be at all protected by exclusive privileges. He has also sent me, in the shape of a pamphlet, in Italian, the prospectus of a Company which he and others propose to establish. When I have had time to digest its provisions, I will send you an epitome of them, as a fitting corollary to the foregoing suggestion. We shall then be able to judge how far it is, if at all, removed from schemes on which Adam Smith and Michel Chevalier would place their ban, and whether there is anything in the present condition of Tuscany that would justify the introduction of an exceptional commercial policy, should my friend's proposal, on examination, deserve to be so designated.

I fear that what M. Maffei, in the plenitude of his zeal for commercial progress in Tuscany, calls "microscopic institutions of credit," really are so, as compared with those of this country. I have had occasion to make some inquiries on this subject, and the result confirms my apprehension. The establishment, therefore, of banks, if possible on the limited principle, would go far to supply this desideratum; and when the new kingdom of Italy shall be sufficiently consolidated to encourage the introduction of British capital, I cannot doubt that the commerce of that country will be largely and safely developed. Of all this there are already many symptoms "looming in the distance;" and I look forward with confidence to the period when the ancient mercantile renown of Italy shall be restored to it, assisted, as manufacturers must previously be, by all those facilities which modern scientific discoveries and appliances will have placed at their disposal.

I am, &c.,

THOS. WINKWORTH.

Gresham Club, March 11, 1862.

The following is Monsieur Maffei's paper:—

Although the data with which tradition and history furnish us are incomplete, and often contradictory, I do not think I shall be far from the truth if I calculate that of spinners, winders, mill boys and girls, dyers, designers, warpers, fly-drivers, foremen, draw-boys, factory clerks, and many others, the number of individuals of both sexes, youths and adults, who lived comfortably upon this industry in the good days of "l'Arte della Seta" (the silk trade), that is to say, from the 13th to the 15th century, was rather above than below 30,000. I say, "who lived comfortably," because a skilful and active weaver, aided by an apprentice, could earn from 1½ to 1¾ fr. per day net wages, after making a weekly allowance to his assistant. It is, however, a fact that almost up to the end of the 18th century (although this art had lost at the latter period much of its former importance and renown) the families of those of comparatively the lowest order, whose wives were employed in weaving, had the principal room of their small, but very cleanly abode abundantly furnished with brass utensils, their sack of wheat flour at the side of their kneading-trough, and 20 crowns in the drawer to provide against the expenses of sickness or of funerals. Hence on fête days, weavers and their daughters might be seen adorned with jewellery, pearls, and rubies, and their sons and husbands with two watches each, and great silver buckles on their small-clothes and shoes. But now, alas, when walking on Sundays or fête days, in the districts inhabited by silk weavers, formerly so clean and cheerful,

we find them dirty and squalid, and no longer regaling the senses with the odour of fowls or of lamb cooking.

At that time, although the art had greatly declined, as I have already observed, the factories of Florence kept in action, almost without any interruption, 5,000 to 6,000 looms to provide for domestic consumption, and to supply the demands of the Levant, of Holland, of Germany (including Vienna), of Russia, through the medium of Königsberg, and of Brazil from the ports of Genoa and Lisbon.

But when the fierce wars provoked by the French Revolution were lighted up, the looms which supported so large a portion of our population were suddenly completely stopped, and this plunged Tuscany, and especially the classes more directly connected with this noble industry, into the greatest distress.

The price of silk having fallen to 24 francs per kilogramme, and that of cocoons to 1f. 50c. per kilogramme, whilst that of wheat had risen to 50 francs the sack (of 55 or 60 kilogrammes) so blinded the landed proprietors as to impel them to cut down and uproot, with a Vandal-like fury, a large portion of the mulberry trees, under the specious and strange pretence that their shade was injurious to the growth of the wheat and other grain. The weavers also broke up and burnt their looms and utensils (which they regarded as useless encumbrances) with such insensate rage, that it could only be by a sort of miracle if any escaped destruction. The proprietors of factories failed one after another, so that the period which elapsed between 1799 and 1814 was one of almost complete annihilation as regards the silk trade of Florence. During this disastrous period, however, the house of Moretti Guitini, of which I was manager, was able to amass a colossal fortune by speculating on a future, which, however delayed, could not fail to arrive in due time; and that of Mateoni also was able to lay the foundation of its fortune by turning to profit the famous and barbarous decrees of Berlin and Milan.

The wars which had deluged Europe with blood having ceased in 1814 with the empire of the First Napoleon, our struggling industry of silk weaving found itself opposed to a much more serious and formidable competition than that which it had experienced prior to the French Revolution, because, in the first place, the French prisoners who remained in Germany and Russia, having there taught the art of silk-weaving to the natives, it resulted that those empires not only were no longer obliged to have recourse to Florence for silk goods, but could, on the contrary, supply us with those especially which were manufactured in Prussia, Belgium and Austria; and in the second place, because the ingenious machine invented by Jacquard, superseding the ancient slow process of cards and draw-boys, had brought about a radical revolution in the art of manufacturing figured silks, from which the French necessarily profited almost exclusively for some time, M. Jacquard having obtained a patent for his invention, while the protective laws which France continued to retain prevented or rendered it very difficult for foreigners to profit by it. Under these circumstances the manufacture of figured silks became an almost absolute monopoly to the French manufacturers. Independently of all these impediments the commercial treaties entered into between England, France, and the States of South America deprived Florence of important commissions from the Brazils, and she could, for the future, reckon only on domestic consumption and on the outlet of the Levant, but was confined in both cases to plain silks, France having, by means of the Jacquard loom, attracted to herself the manufacture of all the fancy silk trade which the luxury of both worlds could require of European industry.

This state of collapse was aggravated by the necessity, which the immoderate destruction of mulberry-trees imposed upon the manufacturers of Florence, of purchasing raw silk, which was of so inferior a quality as to be almost

unsaleable elsewhere, and of throwing it into organzine and tram at their superannuated mills of the thirteenth century. All this announced that Tuscany was on the eve of losing for ever the industry which had so much contributed to render the Republic of Florence rich, famous, and powerful. The Government of that day did not seem at all concerned; and the complaints of the suffering classes, and of some zealous citizens, were stifled by the preponderating voices and sophistries of the adulators who surrounded the throne, and of the wealthy, who had succeeded in monopolising the remains of our commerce and of our struggling trade, and would have desired that this state of things should last for ever.

Fortunately everything has its time here below, and at length the three Tuscans, Zauli de Modigliana, Scoti de Pescia, and Maffei, of Florence (the writer), after having visited and studied the principal and most famous European establishments employed in the culture of silk, conceived (with the conviction that nothing is difficult to him who truly and strongly wills to do it), the bold design of elevating from their profound depression in this country the two branches of this noble industry. Notwithstanding, therefore, the anathemas of the jealous and the envious, and the persecutions of the retrograde, and of all those whose interest it was to oppose every reform, the two first named succeeded, after incredible efforts and sacrifices, in obtaining from our cocoons silks which eclipsed all those known up to that time in the Peninsula, and which were worthy to be ranked amongst the most beautiful in the ultramontane markets; while the last of this triumvirate, who occupied himself with weaving, succeeded, by the aid of a complete assortment of machines and utensils purchased in France, in producing silk goods of such beauty and perfection as successfully to compete with those of Lyons. As evidence of this success he obtained the first prize in the Florence exhibitions, and, what was still more valuable, the flattering eulogiums of the foreign press, as well as the offer of honorary membership on the part of the French Academy of Agriculture, Manufactures, and Commerce. The credit he had thus acquired enabled him to form such intimate relations with the consumers of North America, as sufficed to support almost exclusively, from 1819 to 1844, the silk manufacture of Florence, and to increase his looms in action to the respectable extent of more than 4,000, with the prospect of soon being able to double this number.

But the evil genius which had delighted for more than three years in transferring to a ruinous extent our most noble and important industry to foreigners, succeeded, in 1844, not only in suddenly and unexpectedly arresting its progressive advance, but in causing it to lose in the ten following years much more than it had acquired in the previous thirty.

Zauli and Scoti, to whom the gratitude of their country should have decreed statues during their lives, having died prematurely, poor and neglected; and the loss of more than a million and a half of francs, or £60,000, incurred in speculations in American cotton, having caused the failure of the house of Guerber Gonin, to which belonged the capital which supported and sustained my flourishing establishments, the closing of the latter became indispensable. Thus the unfortunate industry of silk weaving again fell under the exclusive direction of manufacturers who were ignorant, timid, or retrograde. It could not but recede, as we have seen, to such a point as to be unable to keep in action even the half of the 2,000 looms which remained at work up to that time.

We may get some idea of the immense injury, both material and moral, which the country suffers through the decadence of this trade. Considering the special privileges which the provinces of Central Italy enjoy, they possess the elements necessary to manufacture silk goods to the extent of at least one-half of the 3,500,000 kilogrammes, and perhaps more, of the splendid silk which the peninsula of Italy sells raw, or simply thrown into organzines and trams, to foreigners. This would at once

chase from these countries the idleness, misery, and vice arising from poverty, and would enrich the country by at least 45,000,000*fr.* per annum (£1,800,000), a source of revenue which would be by no means contemptible in our present financial position, but to which we cannot aspire until the time when the spirit of association shall be re-awakened, and our microscopic institutions of credit are replaced by banks, the funds at whose disposal shall harmonise with the wants of our commerce and manufactures.

MEETINGS FOR THE ENSUING WEEK.

- MON.....British Architects, 8.
Medical, 8½.
Royal United Service Inst., 8½. Capt. C. Pasley, R.E.,
"The War in New Zealand."
TUES....Civil Engineers, 8.
Statistical, 8. 1. Mr. W. G. Lumley, "Observations on the
Statistics of Illegitimacy." 2. Dr. Mouatt, "Prison
Statistics and Discipline in Lower Bengal."
Pathological, 8.
Ethnological, 8. 1. Mr. Wm. Bollaert, F.R.G.S., "On the
Ancient Indian Tombs of Chiriqui in Veragua, on the
Isthmus of Darien." 2. Mr. C. Carter Blake, "Note on
the Stone Celts from Chiriqui."
Royal Inst., 3. Mr. John Marshall, "On the Physiology of
the Senses."
WED....Meteorological, 7.
Society of Arts, 8. Mr. Robt. Rawlinson, C.E., "On the
Sewerage of Towns."
Geological, 8. 1. Prof. R. Harkness, F.R.S., "On the
Permian Beds of Westmoreland, Cumberland, and Dum-
friesshire." 2. Mr. A. Geikie, "On the Data of the last
Elevation of Central Scotland."
THURS....Royal, 8½.
Antiquaries, 8½.
Linnean, 8. Mr. George Busk, F.R.S., "Observations on
some Skulls from Ceylon."
Chemical, 8. Mr. A. H. Church, "On the Isolation of
Phenyl."
Numismatic, 7.
Royal Society Club, 6.
Royal Inst., 3. Professor Tyndall, "On Heat."
FRI.....Royal Inst., 8. Mr. F. A. Abel, F.R.S., "On some of the
Causes, Effects, and Military Applications of Explosions."
Royal Horticultural Soc., 2.
Royal United Service Inst., 3. Major Strange, "Geodesy,
especially relating to the great Trigonometrical Survey of
India."
SAT.....Royal Inst., 3. Mr. Henry F. Chorley, "On National Music."
Asiatic, 3.
Royal Botanic, 3½.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

- Par Numb.
Delivered on 20th February, 1862.
6. Court of Session and Sheriff Courts (Scotland)—Return.
13. Scottish Universities—(Paper).
47. Bank of England—Annual Accounts.
48. Bank of England—Copy of Applications for Advances to Govern-
ment.
49. Scottish Universities—Copy of an Ordinance.
51. Committee of Selection—First Report.
44. Navy (Ships)—Account.
30. Railway and Canal Bills—General Report of the Board of Trade.
Delivered on 21st February, 1862.
21. Irish Reproductive Loan Fund—Account.
37. Flogging (Army and Militia)—Return.
40. Mint—Account.
3. Corporal Punishment—Return.
Delivered on 22nd and 24th February, 1862.
12. Metropolitan Board of Works—Account.
34. East India (Oude Claims)—Return.
43. Trade and Navigation Accounts (31st December, 1861).
45. Navy (Steam and Sailing Ships)—Return.
57. Railway and Canal Bills—First Report from Committee.
27. Naval Receipt and Expenditure—Account.
59. Committee of Selection—Second Report.
4. Bills—Poor Relief (Ireland) (Mr. Hennessy).
Japan—Correspondence.
Shipping—Reports from Her Majesty's Consuls.

SESSION 1861.

- 324 (Aix.). Poor Rates and Pauperism—Return (A.)
Delivered on 25th February, 1862.
50. Army Estimates for 1862–63.
17. Bills—Trade Marks.
11. „ Marriages (Ireland).

Delivered on 26th February, 1862.

38. Army (Commissions)—Return.
46. Flogging (Navy)—Return.
53. East India (Native Merchant Claims)—Papers.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, March 7th, 1862.]

Dated 29th October, 1861.

2702. J. Watt, 35, Lorrimer-street, Walworth, and T. S. Haviside, 69, Cornhill—Imp. in the manufacture of soap.

Dated 17th January, 1862.

126. B. Moss, Liverpool—The application of steatite, either alone or in combination with other substances, to the manufacture of bricks, fire bricks, the lining of furnaces, and other similar purposes.

Dated 11th February, 1862.

356. W. Wood, Monkhill, Pontefract—Imp. in the process of manufacturing pomfret or liquorice cakes.

Dated 13th February, 1862.

384. T. Davison, Belfast—Improved means for preventing the corroding of steam boilers.

Dated 15th February, 1862.

403. T. Renison, Glasgow—Imp. in water closets.
404. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in electro-magnetic timekeepers. (A com.)
407. J. Wall and T. Dodd, Liverpool—Imp. in the construction and arrangement of apparatus for regulating the flow or passage of fluids.
409. T. Horsley, 10, Coney-street, York—Imp. in apparatus for turning and closing the cartridges of breech-loading fire-arms.
410. J. Cooke, Willington, Durham—Imp. in the method of propelling ships and other vessels.
411. D. D. Kyle, Victoria-street, Westminster—An improved method of communicating or signalling in and with railways trains.
413. J. Chatterton, Highbury, and W. Smith, Dalston—Imp. in telegraph cables.
417. J. Russell, Westbury-villa, Camberwell—Imp. in the method of raising sunken, submerged, or stranded vessels.

Dated 17th February, 1862.

419. H. Crawford, J. Crawford, R. Crawford, and R. Templeton, Beith, Ayr, N.B.—Imp. in looms for weaving.
421. J. Whitaker, Leigh, Lancashire—Imp. in machinery or apparatus for pulping roots.
422. J. J. Van den Berg, Hague—A new fire lighter.
425. J. Combe, Belfast—Imp. in machinery for winding cops, and in the treatment of cops for warps and other purposes.

Dated 18th February, 1862.

427. J. H. Hastings, J. Freezer, Holkham, and J. Woods, jun., Wells, Norfolk—Imp. in ploughs.
428. R. Watkins, 14, Lower Belgrave-place, Pimlico—Imp. in oil and spirit lamps, and in the means of producing light therein, parts of which improvements are applicable to lamps generally used.
431. W. Clark, 53, Chancery-lane—Imp. in gas apparatus used in lighting cigars and other tobacco. (A com.)
432. M. Henry, 84, Fleet-street—Imp. in cartridges. (A com.)
433. W. Bush, Tower-hill—Imp. in omnibuses and other carriages.

Dated 21st February, 1862.

460. R. H. Skeliern, South-terrace, Hatcham-park—An improved self-inking hand stamp or press.
462. J. Standish, and J. Gooden, Egerton, near Bolton—Imp. in machinery or apparatus for stripping or cleaning the flats of carding engines.

Dated 22nd February, 1862.

470. W. Ashton, Manchester—Certain imp. in machinery or apparatus employed in the manufacture of braids and similar articles.
472. J. Kirkwood, Paisley—Imp. in looms for weaving.
474. J. Millington, Oaken Gates, Shropshire—A new or improved hearse or bier.
476. C. H. J. W. M. Liebmann, Huddersfield—Imp. in felted fabrics suitable for carpets and other similar purposes, and in the apparatus employed therein.
480. G. Blakey, S. Blakey, and J. Blakey, Liverpool, and B. White, Birkenhead—Imp. in leggings or gaiters.
484. M. A. F. Mennous, 39, Rue de l'Échiquier, Paris—Imp. in burners for heating by gas. (A com.)

Dated 24th February, 1862.

486. G. West, 1, Chapel-place, Long-lane, Borough—Imp. in the construction of washing machines.
490. T. Blair, Carlisle—Imp. in machinery or apparatus for cutting, chopping, and breaking refined lump sugar and other substances.
492. T. N. Kirkham, West Brompton, and V. F. Ensom, Highgate—Imp. in bleaching and dyeing yarn and thread when in the form of cops or otherwise wound.

493. W. E. Newton, 66, Chancery-lane—Imp. in the joints or chairs of the permanent ways of railways. (A com.)

Dated 25th February, 1862.

500. J. Woodrow, Oldham—A certain imp. in the manufacture of hats or coverings for the head.
502. J. Piddington, 52, Gracechurch-street—An improved machine for shelling or husking all kinds of grain. (A com.)
504. E. Bliss, 36, Percival-street, Clerkenwell, and H. Lamplough, 113, Holborn-hill—Improved means for viewing microscopic photographs and other minute objects.

Dated 26th February, 1862.

518. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in emptying or draining the water from careening docks in maritime ports. (A com.)
520. A. D. Duparet, Paris—Imp. in the ornamentation of tissues.
522. J. H. Bennett, Blackburn—Imp. in steam generators, and in engines to be worked by atmospheric pressure or steam and air combined.
524. J. Cliffl, Lambeth—Imp. in glazing stoneware, red clayware, porcelain, and other kinds of earthenware.
526. C. L. Knoll, 187, Tottenham Court-road—Imp. in pianofortes.
528. E. G. Bruzaud, Pembroke-road, Kensington—Imp. in pianofortes.
530. J. Medhurst, 53, Lower Queen-street, Rotherhithe—Imp. in apparatus for reefing and furling the top sails, courses, and other square sails of vessels.

Dated 27th January, 1862.

532. G. Torr, Bucks-row, Whitechapel—Imp. in and an improved apparatus for manufacturing and reburning animal charcoal.
534. C. Clark, 361, City-road—Imp. in tea and other trays for the table.
538. Sir C. T. Bright, Victoria-street, Westminster—Imp. in electric telegraphs, and in apparatus connected therewith, and employed in the manufacture thereof.
542. W. S. Wood, Leeds—Imp. in valves for regulating the flow of steam, water, or other fluids, and in means or apparatus for working or actuating them direct from the governor, or when worked by expansion cams in connection therewith.

INVENTION WITH COMPLETE SPECIFICATION FILED.

573. P. Rémond, 39, Rue de l'Échiquier, Paris—Imp. in double rein bridle bits.—3rd March, 1862.

PATENTS SEALED.

[From Gazette, March 7th, 1862.]

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| <i>March 7th.</i> | 2289. W. Wheatstone. |
| 2245. G. Malcolm. | 2340. W. Clark. |
| 2248. P. B. O'Neill. | 2344. J. Graham. |
| 2257. J. Smith. | 2441. P. A. F. Bobœuf. |
| 2260. W. L. Thomas. | 2475. P. Knowles. |
| 2274. W. H. Delamare. | 2803. B. Dobson and J. Clough. |
| 2276. R. Smith, B. Brooks, and J. Smith. | 3188. J. Smith and J. B. Higgs. |
| 2280. T. L. Murray. | 3260. W. Tongue. |
| 2288. R. Waller. | 3262. W. Tongue. |

[From Gazette, March 11th, 1862.]

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|----------------------------------|-----------------------|
| <i>March 11th.</i> | 2308. W. Stewart. |
| 2264. W. Steevens. | 2310. R. A. Brooman. |
| 2272. W. Davis. | 2313. W. Tuxford. |
| 2273. W. Farlar. | 2345. S. Hawksworth. |
| 2279. R. A. Brooman. | 2389. J. Musgrave. |
| 2282. C. Sutton. | 2466. T. Warwick. |
| 2283. H. Dixon and J. R. Renner. | 2520. G. Davies. |
| 2285. G. Dixon. | 2800. W. A. Shepard. |
| 2292. F. Barnett. | 2974. D. Ker. |
| 2303. J. Reeves. | 2997. H. Wilde. |
| 2304. T. Meriton. | 3208. W. M. Williams. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, March 7th, 1862.]

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| <i>March 4th.</i> | 601. A. Booth and A. Booth. |
| 580. J. Leigh. | 642. A. Tylor. |
| 584. W. P. Savage. | |

[From Gazette, March 11th, 1862.]

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| <i>March 6th.</i> | 643. T. Lightfoot. |
| 598. J. P. Clarke. | 670. H. Bessemer. |
| 647. T. Patstone. | |
| <i>March 7th.</i> | |
| 610. J. A. Williams. | 655. J. Dixon and R. Clayton. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, March 7th, 1862.]

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| <i>March 5th.</i> | 505. W. Weild. |
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[From Gazette, March 11th, 1862.]

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|-------------------|--------------------|
| <i>March 7th.</i> | 538. S. C. Lister. |
| 504. J. Cooper. | 618. W. Smith. |

Journal of the Society of Arts.

FRIDAY, MARCH 21, 1862.

INTERNATIONAL EXHIBITION OF 1862.—SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £446,800, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The success of the Exhibition and the punctuality of the opening seem to be threatened by the delay of British exhibitors. The preparations of Foreign countries, contrary to the experience of 1851, seem to be in a much more forward condition than even those of our countrymen, who will require most time and trouble to complete their arrangements. Already several of the counters and fittings are erected in the French court, and the preparations of Austria, the Zollverein, and Belgium, are equally advanced; while on our own side scarcely anything is to be seen besides some very handsome cases which are being erected by Mr. J. Drew, for the leading goldsmiths' firms. An instance may be given of the supineness which seems to be the only thing at present exhibited by British manufacturers. A leading firm had obtained a large space for the erection of a trophy in the south-eastern transept, and accordingly some time ago they commenced digging the foundations on which to rest their bulky goods. The earth, so excavated, was thrown on the surrounding floor in such quantity as to sink the flooring several inches by its weight, and in this unsightly condition the whole thing has been left without being touched for nearly a fortnight, to the loss of the exhibitor, who has to re-lay

the floor, and to the detriment of the Exhibition. English exhibitors will do well to consider that her Majesty's Commissioners are in earnest when they fix the 31st of March as the latest day on which cases, fittings, counters, and heavy goods will be received, and that they really are liable to be rejected if sent after that day. Of course light delicate objects, as philosophical and surgical instruments, which are liable to injury in a building where dust and dirt are prominent features, need not be in their places so early, but it is imperative that the cases which are to contain them should be on the spot, at the very latest, by that date. Carriages, too, which are easily brought into the building, will probably be admitted during the early part of April.

Mr. Crace's decoration of the domes, as seen from below, though concealed by the masses of scaffolding, promises to be highly effective, and when fully realised, as it may be by ascending a few ladders, amply repays the labour and fulfils its promise. The designs for the medallions in the spandrels have been executed by Mr. R. Burchett and his pupils, at the School of Art, South Kensington, in the short period of a fortnight. The flooring of the domes has also commenced in parts where it is not liable to be disarranged by the descent of the heavy balks of timber from above. As it is probable that the eastern dome will be the scene of the opening ceremony, it is important that it should be advanced as rapidly as possible.

The arrangements for the ceremony itself are not fully settled in detail, although to a great extent principles are determined on. One of such principles fully fixed is, that guarantors who may be season-ticket holders, will have priority in the selection of reserved seats for witnessing the ceremony.

The eastern annexe is getting gradually occupied with heavy cases, containing machinery, principally from abroad, though none of this is as yet fitted. It is expected that this week a rather novel sight will be witnessed in the streets of London; a large quantity of French goods, too heavy for the ordinary means of conveyance, will be brought from the river side to the Exhibition building by a train of waggons drawn by one of Bray's traction engines. Three heavy masses of steel, one of twenty, one of ten, and one of seven tons, are also expected to arrive from the Zollverein.

Preparations for erecting the trophies in the nave and transept are going on, though scarcely with such rapidity as could be desired. Messrs. Kelk and Lucas, who have taken, in many cases, the contracts for laying foundations, &c., have a great quantity of work on their hands. Messrs. Elkington have commenced the erection of their trophy of electro-plate, and the Coalbrookdale Company are well advanced with their arrange-

ments. On the Foreign side the French are beginning to raise a magnificent case of iron-work, by Barbezat, of Paris, the same gentleman who is erecting his fountain in the Horticultural Gardens. This beautiful piece of workmanship will be 120 feet long, and is to contain in the centre a glass 18 feet by 9. Norway, too, has commenced the erection of a stand of arms.

FOURTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 19TH, 1862.

The Fourteenth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 19th inst., Mr. Alderman Mechi in the chair.

The following candidates were proposed for election as members of the Society :—

Coles, Charles.....	{ 86, Great Tower-st., E.C., and The Firs, Mitcham, S.
Dawson, Henry	{ 16, Finsbury-pl. South, E.C.
Dovey, Wm. Thos.	{ 10, Cunningham-place, St. John's-wood, N.W., and 6, Crosby-square, E.C.
Houghton, James	{ 114 and 115, Tottenham- court-road, W.
Howe, Wm. Francis	{ 6, Newman's court, Cornhill, E.C., & 5, Lower Belgrave- street, Eaton-square, S.W.
Mackay, Thos. Miller ...	{ 24, Leinster-gardens, Hyde- park, W.
Marshall, Joseph Gilbert Blair.....	{ 7, Vicarage-terrace, Strat- ford, E.
Pearce, Wm. Peter	{ 66, Gresham House, Old Broad-street, E.C.
Preedy, J. K.....	{ 98, Gracechurch-street, E.C.
Purdy, William.....	{ 54, Old Broad-street, E.C.
Ward, Wm. George	{ Sherwood-rise, near Notting- ham.
Wood, Henry, Thos.....	{ 22, Watling-street, E.C.

The following candidates were balloted for and duly elected members of the Society :—

Alexander, Francis.....	{ 103, Leadenhall-street, E.C.
Brown, Alfred	{ 25, Newman-street, Oxford- street, W.
Capper, Walter	{ 69, Gracechurch-street, E.C., and 3, Kidbrooke terrace, Blackheath, S.E.
Chambers, Thomas, jun..	{ 55, Coleman-street, E.C.
Clarke, G. Somers.....	{ 20, Cockspur-street, S.W.
Davis, Geo. Henry, LL.D.	{ Religious Tract Society, 56, Paternoster-row, E.C.
Donne, William, jun.....	{ 51, Cheapside, E.C.
Edwardes, Alfred	{ Warwick house, Regent- street, W.
Gooch, Thomas.....	{ Seacombe-lodge, Clapham- park, S.
Hollow, James	{ 1, Crown-court, Old Broad- street, E.C.
Jordan, Henry	{ 17, Gracechurch-street, E.C.
Lawes, Thomas.....	{ 65, City-road, E.C.
Lines, John Phillips	{ Lloyd's Patriotic Fund, County Chambers, 14, Cornhill, E.C.
Macrea, Alex. Septimus..	{ 18, Chapel-street, Liverpool.
McCrae, Henry Chas.....	{ Halifax, Yorkshire.
McEwen, David Painter..	{ Highwood-house, Mill-hill, N.W.
Morse, Hon. F. H.....	{ Consulate of the United States of America, 67, Grace- church-street, E.C.

Mottram, John	{ Boy-court, 35A, Ludgate-hill, E.C.
Moulton, Stephen	{ Kingston-house, Bradford-on- Avon, Wilts.
Patten, William	{ 22, Old Fish-street, E.C.
Porter, Robert	{ 29, Great St. Helen's, E.C.
Prince, George	{ 204, Upper Thames-st., E.C., and 32, Clifton-road, Carl- ton-hill, N.W.
Robinson, John	{ Durban, Natal; and 10, Arundel-st., Strand, W.C.
Skipper, Chas., jun.....	{ 1, St. Dunstan's-hill, Great Tower-street, E.C.
Spargo, Thomas.....	{ 224 and 225, Gresham-house, Old Broad-street, E.C.
Walton, Christopher	{ 24, Ludgate-street, E.C., and Highgate, N.
Watney, Norman	{ The Brewery, Pimlico, S.W.
Weston, Edward	{ Rokesby-house, Hornsey, N.
Whitaker, Joseph	{ Seaforth, near Liverpool.
Whitaker, William	{ Bradford, Yorkshire.
Wright, Philip	{ 20, Adelaide-rd. North, N.W.

The Paper read was—

ON THE SEWERING OF TOWNS AND DRAIN- ING OF HOUSES.

BY ROBERT RAWLINSON, C.E., F.G.S., &c., &c., &c.

Member of the Sanitary Commission sent out by her Majesty's Government to the Army in the Crimea.

Town-sewerage on a grand scale is certainly co-existent with the Roman Empire, and earthenware pipes are, probably, as old as the art of pottery. It has been ascertained that pipes of earthenware, "hand-thrown" on a potters' wheel, and not unlike, in form and dimensions, to hand-made pipes of the present day, were used throughout the East in the remotest periods we are acquainted with, to conduct springs of water for human uses.

Earthenware pipes have been found beneath the great mounds of Assyrian ruins, which pipes are supposed to have been drains; and the stalls in the Colosseum of Rome were drained with earthenware pipes. Earthenware pipes were also used by the Romans for watercourses.

The cloacæ of Rome, including the Cloaca Maxima, according to Livy, are as old as the reign of Tarquinius Superbus. Some authors declare that the construction of these public sewers must belong to an Etruscan Nation, which preceded the birth of Romulus and Remus.

These old sewers, the ruins of which are to be seen in Rome to this day, were also, "sub-ways" and sewers, having raised paths along the sides, and "side-entrances" for tributaries, from palaces and fountains. There were large cloacæ in the several cities throughout the empire, as mentioned Pliny's letters to the Emperor Trajan. I have met, in the works of travellers, with descriptions of other ancient sewers and drains found beneath ruins in the East, the date of the formation of such sewers being lost in the darkness of antiquity. It is, no doubt, impossible to trace out the origin of sewers and drains; their "invention," construction, and use, probably took place and commenced with civilization. We cannot, however, settle this point this evening. We have another purpose, namely, to discuss the uses and the abuses of sewers and drains at this day.

The Roman cloacæ were, probably, in many instances, of the character of the great sewers in this metropolis,—the Fleet, the Ranelagh, and others;—watercourses enclosed and arched to serve as sewers. The remains of sewers and drains found amidst ruins show us that their application was limited, and their uses only imperfectly understood. If sewers and drains had been generally in use amidst the populous cities and towns of antiquity we should now find their remains abundantly. We know the extent of the Roman Empire more fully and better by the buried remains of Roman

pottery than by history, or than by any ruins or traces of ruins remaining on the surface. Brick sewers and earthenware pipe drains, if they had ever existed, would have been as enduring in their materials as frail pottery, or as the stone and brick cloacæ of ancient Rome and the drains of the Colosseum. We do not find such remains in abundance, and therefore conclude that a limited construction only took place for special purposes. The Roman cloacæ were originally under the superintendence of the censors; subsequently under that of the ædiles. The Emperors Agrippa and Trajan constructed many cloacæ during their reigns. We, in these modern times, divest our Imperial Government of all such useful power.

Earthenware pipes, of three and four inches diameter, were made in England more than a half-a-century since, in Lambeth and in other places. Mr. Doulton, senr., can recollect their being made during this space of time, and I have received other evidences as to the make of earthenware pipes 40 or 50 years ago in England. The first modern use of them, for sewer purposes, was suggested by Mr. Edwin Chadwick, C.B., soon after the year 1840. Mr. John Roe states in his Report to the Harrow Local Board of Health (1854):—"The introduction of stoneware pipes for general drainage arose from a suggestion made by Mr. Chadwick to me, in his desire to obtain smooth interior surface; and the first sewer pipes made for that purpose in the metropolis were for the Holborn and Finsbury office." In consequence, Mr. Roe further states, "immense benefit to sanitary measures has been afforded by the use of earthenware pipes, where judiciously applied and properly laid. They save fully two-thirds the cost of brick sewers; that is, where brick sewers for a town would cost £30,000, the same town may be sewered by earthenware pipes for a cost of £10,000, and the cheaper pipes will effect the work far safer to health and life than the costly brick constructions." Combined back drainage is of the utmost importance, in point of economy, and also in efficiency of working, where the drain-pipes are properly laid. There are many thousands of instances of successfully combined back drainage, in scores of towns, and complaints of failure or of annoyance are very rare. I do not think they amount to one per cent. upon the work executed. Mr. John Roe, in 1854, stated that, "36 years previously (1818), 200 houses on one estate, in the Holborn and Finsbury districts, had combined back drainage, and no complaint of their working or otherwise ever came in that period of time to the office." Mr. Roe further states, "in many country towns and places, back drainage may be usefully adopted." This is the doctrine of the first Board of Health anticipated and confirmed. In some places back drainage will be impracticable, and, of course, should not then be adopted.

It is a great advantage to have a regular flow of water through any sewer. Drains are choked more from want of water, than by having too much passed through them. Combine drains as much as practicable, lay them well, joint them evenly, properly, and smoothly, and there will be very few if any chokings.

Fully to understand the worst effects of want of sanitary arrangements in towns, we must go back to the days of the plague, sweating-sickness, and other similar diseases, and read up the literature of 1600 and 1700, by Nathan Hodges, M.D., on the Plague of London, 1665; a Discourse on the Plague by Dr. Mead; an Essay on the Different Causes of Pestilential Diseases, by John Quincy, M.D., and others; until we come to James Lind, M.D., and Sir John Pringle, the one on diseases in the navy, and the other on diseases in the army. We may then visit the cities and towns in the East, where plague rages to this day, and see the causes in existence which prevailed in England two centuries since, and some of which causes prevail even now. Filth, squalor, darkness, neglect, vice, crime, and premature death; an annual mortality of 40, 50, and 60 in the 1,000 regularly, with an increase up to 100, 200, and even, in some places, 500 or a moiety of the entire population in one year, of plague and general

sickness; "the living too few to bury the dead." The annual mortality of England at present in towns ranges from 30 to as low as 15, and even 11, in each 1,000. It is thought 15 ought not to be exceeded even in our towns.

The Sanitary Commission of 1855 in the Crimea, showed what could be done for an army in the field, where the mortality fell below that of the same troops in barracks at home, the French army knowing no such abatement. When fever had been all but banished from the British army and hospitals, the French at the end of the war were said to be losing by sickness in hospitals at a rate of 5,000 per month. 15,000 men perished in hospital during the last three months of the war, as per French army medical returns.

There are no doubt many causes for disease in excess, but overcrowding, defective ventilation, and surrounding filth, seem to be the worst. Proper sewers and drains will improve a town, but will not do all that is required.

The causes of fever in Liverpool, previous to the year 1840, were overcrowded cellar dwellings. The causes in Glasgow and in Edinburgh are overcrowded upper rooms and attics. The narrow streets, crowded houses, and small rooms of many continental towns may be improved by sewerage, drainage, surface pavements, and regular cleansing. But many of the causes of disease in excess might remain.

"Sewer," according to Lord Coke, a place where water "issues;" or, vulgarly, "sues," whence the word "suera" or sewers. There are laws relating to sewers from Magna Charta to recent times. Callis, on the law of sewers, is the great authority. These laws, however, relate to sea defences, weirs, rivers, estuaries, and land-floods, rather than to town sewers.

Many persons use the words sewer and sewage improperly; they should be used as—

Sewer, a public sewer in street or road.

Sewage, that which flows through a sewer—the fluid.

Sewers or sewerage, the plural of sewer.

Drain, a tributary to a sewer from house, building, or court.

Drains or drainage, the plural of drain.

Sewers were first constructed in London under an Act (6 Henry VI., c. 5), 1428, amended by parliament in the reign of Henry VIII., and since this period to the present time there have been many amendments and alterations of laws for regulating sewers, into which I do not propose to inquire. The streets of London were begun to be paved in 1533. The first sewers in London would no doubt be in the several valleys on the line of existing watercourses, the Fleet Ditch, the Ranelagh Level, &c. These watercourses were arched over, and the drainage of the adjoining streets and houses passed into them.

Stowe states that, "Antiently, until the time of the Conqueror, and two hundred years later, this City of London was watered (besides the famous river of Thames on the south part), with the river of the Wells, as it was then called, on the west; with a water called Walbrook, running, through the midst of the City, into the river of Thames, sewerage the heart thereof; and with a fourth water, or bourn, which ran within the city through Langbourn Ward, watering that part in the east. In the west suburbs was also another great water, called Oldbourn, which had its fall into the river of Wells."

The Fleet Ditch* was no doubt originally (in ordinary weather) a stream of bright, sparkling, sweet, and wholesome spring water—a river of "wells." But as early as 1290 the monks of White Friars complained to the king that the putrid exhalations arising from the river of Wells or Fleet, were so powerful as to overcome all the frankincense burned at their altars during divine service, and even occasioning the deaths of many of the brethren. The Fleet continued to receive additional impurities, until it became in the time of Pope—

* "Fleet." This name is derived from the rapid flow of water from the higher districts drained.

"The king of dykes, than whom no sluice of mud
With deeper sable blots the silver flood."

Barges are said to have sailed up the Cloaca Maxima and the Fleet sewer alike; in both instances natural water-courses having been arched over and made receptacles of sewage.

Although the first formation of public sewers in the British metropolis dates so far back as 1428, by far the greater portion of the 1,500 miles of the main sewers in London have been constructed since the year 1824. Mr. John Roe having had the perseverance, honour, and credit of effecting more improvements in the main sewers of his districts, Holborn and Finsbury, up to the end of his period of service, than any other man. The improvement of adopting the egg-shape, in place of vertical sides for sewers, the introduction of side entrances, and means of flushing, and the experiments carried out by Mr. Roe and tables based on these experiments, are invaluable for the metropolis. Mr. Roe found the construction of sewers a matter of guess; he left it a matter of scientific certainty. If all the sewers of this great metropolis had been laid out and constructed on the plan proposed and adopted by Mr. Roe, in his divisions, vast additional sums of money would have been saved, and (humanly speaking) many lives prolonged; the flat-bottomed sewers which now exist would have had semi-circular channels, and the deposit which now accumulates and corrupts would have been regularly washed out, or periodically "flushed" out at short intervals. Mr. Haywood has more recently done for the City what Mr. Roe did for Holborn and Finsbury.

The ventilation of sewers by vertical shafts and open grates in the centres of the streets was, no doubt, an improvement, though a very clumsy and disagreeable plan. Previous to the formation of these open ventilators, typhus and typhoid fevers prevailed in many houses connected by drains with the sewers and near the untrapped gully-holes. Mr. Fuller, a medical gentleman, in his evidence, 1834, states that eight-tenths of all the cases of typhus fever he witnessed he could trace to foul drains or foul gullies. The late Dr. Southwood Smith gave evidence to the same effect.

At present there is much injury effected by sewer gases passing through drains and into houses. In 1859, on the use of a disinfectant in the public sewers having a powerful odour, all the houses directly drained by these sewers were tainted, shewing that there was a flow of air from the sewers to the houses. This should not be, and can only be avoided by external ventilation of each house-drain.

The progress of a nation may be measured by increase of population, by spread of education, by increase of commerce and wealth, by increased value of human life and respect for it, and by improvements in morals, in obedience to the laws of the realm, and in religion. We may read, in the eloquent pages of our great historian, Lord Macaulay, how England appeared about the year 1688. He wrote:—"Everything has been changed but the great features of nature and a few massive and durable works of human art. We might find out Snowdon and Windermere, the Cheddar Cliffs and Beachy Head—we might find out here and there a Norman minster, or a castle which witnessed the wars of the Roses; but, with such rare exceptions, everything would be strange to us. Many thousands of square miles which are now rich corn land and meadow, intersected by green hedgerows, and dotted with villages and pleasant country seats, would appear as moors overgrown with fuize, or fens abandoned to wild ducks; we should see straggling huts built of wood and covered with thatch, where we now see manufacturing towns and seaports renowned to the furthest ends of the world."

The population of England, in 1690, was computed at nearly five millions and a half. The manners of the inhabitants were in accordance with the state of the country. In the northern counties bands of Scottish marauders fought with moss-troopers—the parishes were required

to keep bloodhounds for the purpose of hunting freebooters—oxen were penned at night beneath the overhanging battlements of the residences—the inmates slept with arms by their sides—and, on a journey, it was necessary to carry provisions, for the country was a wilderness which afforded no supplies. Such was the state of England at the commencement of the year 1700, or little more than a century and a half since. To find a parallel to this state of things, we must now go to Russia in the north, and to the cities of the Sultan in the east. Here we may see vast tracts of land uncultivated, and without proper roads—the inhabitants wearing, and even working with, weapons of defence and offence in their belts or sashes—cities and towns reeking in filth—hovels for houses—food of the worst and poorest character—no security for person or property, human life having the least possible value—poor cultivation of land—no proper roads—in the towns no sewers no drains, but a maximum of human misery and degrading vice in the East, and of drunkenness and ignorance in the North.

To ascertain the state of England in our own day, and at the present time, we must study in "Blue Books" the sanitary reports; and, although a commencement of sanitary work has been made, there are vast and wealthy populations living amidst cesspits and cesspools. The good work has, however, been commenced—about 400 cities, towns, and places in England having adopted the powers of the "Public Health Act," 1848; or of the "Local Government Act," 1858. The "Common Lodging Houses Act" of Lord Shaftesbury may be adopted; and, where put in force, the results are most beneficial.

The question of sewerage and drainage concerns the poor more than the wealthy. Firstly, on account of numbers; and secondly, because of close crowding. The poor must live, or linger rather, in squalor, sickness, and misery, and die prematurely, in such habitations as are provided for them. The fatal room tenements in English towns, the mud cabins of Ireland, and the boothies of Scotland, all tend to fill our gaols, lunatic asylums, and workhouses. When shall we learn and fully comprehend the fact that it will be more in accordance with the requirements of civilisation, and even more economical, to prevent vice, and to make virtue possible, rather than to expend all our energies on reformatories, to make home comfortable rather than to build and endow public libraries, lecture-rooms, and reading-rooms? Do not neglect these, but first make the poor man's home wholesome.

The preponderance of numbers is shown in the case of Manchester and Salford. From a return by the Poor-Law Board of the numbers and occupiers of dwellings in parliamentary boroughs, it is shown that in Manchester, in 1859, there were 64,426 separate dwellings, of which number 24,457, or 38 per cent., were of £10 annual rental or upwards; 22,538, or 35 per cent., below £10 and above £6 rental; and 17,431, or 27 per cent., not exceeding £6; or, in the whole, about 62 per cent. at and below £10 rental.

In Salford there were 20,156 dwellings; 5,205, or 26 per cent., of £10 rental and above; 8,131, or 40 per cent., of £6, and below £10 rental; 6,820, or 34 per cent., not exceeding £6 rental. Taking Manchester and Salford in one district, there were 84,582 dwellings, of which 29,662, or 35 per cent., were £10 rental and upwards; 30,669, or 36 per cent., of £6, and not exceeding £10 rental; and 24,251, or 29 per cent., at and under £6 annual rental.

Many of the houses below £8 per annum rental are of faulty construction. They are generally in rows, back to back, having no back doors nor windows, no yard nor privy, no sinkstone, nor internal water supply. Many sleeping-rooms have no flue, nor adequate means of ventilation. Privies have to be used in common, and, of course, are not what the name implies; they are frequently ruinous, and sickeningly dirty. Experience has shown that numbers of families should not be compelled to use

privies common to several houses, unless regular cleansing is enforced. Every dwelling-house should have its own convenience. It is a libel on the poor to say they will not care for their own comfort. There are thousands of instances to the contrary. In Manchester, for the poor, waterclosets are the exception. The local municipal regulations discountenance them.

The annual death-rate in Manchester is 30.56 per thousand, or double the death-rate in some districts. The death-rate throughout the manufacturing towns of Lancashire and Yorkshire generally is high, and will continue to be so until better sanitary regulations are adopted and enforced. The excuse offered by the Manchester Corporation is, "Supplying the poor with waterclosets, would waste water, and foul the rivers." Proper apparatus will prevent the first, and intercepting sewers the latter.

London shows a diminished death-rate in proportion to the abolition of cesspools, although the sewerage is most defective, and the River Thames is fouled. Many thousands of cesspools have been abolished in the metropolis, probably not less than 100,000, within the last twenty years, but many thousands remain. Mr. John Roe, and some of the other district engineers, improved many miles in length of the metropolitan sewers and drains, but there are still many miles in length ruinous and foul. London is, however, much more healthy than the manufacturing towns of Lancashire and Yorkshire.

Those who wish to experience the horrible character of the cess-pits and middensteads of Manchester, Liverpool, and other northern towns should study the statistics as they are weekly recorded, of 1,200 and 1,400 such places emptied, and then make a few night inspections of the localities in the hands of the "night-men;" the stench is abominable, many times worse than the Thames at its worst. The rivers flowing through Manchester can scarcely be worse than at present. The Irwell, the Medlock, and the Irk, are a disgrace to our civilization. They are fouled from their sources to their estuary; and if the erection of water-closets could be absolutely prohibited, the construction of intercepting sewers should be made imperative. The solids of sewage can be precipitated, but agricultural land is the proper place and use for sewage.

In many cities and towns where sewerage and drainage are carried out, water closets are in general use. This is the case in the metropolis. For several years past some 1,000 soil-pans have been made and sold per week, or some 50,000 per annum, and they are, of course, used. In the cities and towns of Berwick-upon-Tweed, Alnwick, Morpeth, Carlisle, Lancaster, Halifax, Worthing, and many other places in England, the poor use this convenience, and do not abuse it. In Manchester 100,000 loads of night-soil are annually removed at a loss of some £6,000 per annum. In London the removal of dry ashes produces an income to the parishes.

There is no general rule for the dimensions of town sewers for populations below 100,000 in proportion to surface area; and any engineer who adopts the dimensions given in certain published tables will most probably make an expensive mistake for the district in which he is operating. The tables which are based on experiments made in the Metropolitan sewers are no doubt correct and absolute for the districts from which they were constructed, and will be applicable to any other similar district, if all the peculiarities and contingencies are similar, but they are not applicable to towns generally. I have never used these rules, and should have caused great waste of money if I had done so. The science of engineering cannot be tabulated, and this truth ought to be inculcated on every student. As well say that all sorts of diseases can be cured with one set or sort of pills, as that tables of strengths of materials and dimensions of sewers can be relied upon, without the experience of practice. The published tables I allude to have worked injury, not only in Great Britain, but all over the continent, where many sewerage works have been attempted.

The civilized world looks to this country for practical information on this subject.

The recorded experiments of the best hydraulic engineers on the flow of water in open channels and in pipes may be relied upon. There is little to learn in this branch of hydraulics. Pipes have capacity in proportion to the squares of their diameters, and water obtains downward velocity in strict accordance with the laws of gravity, modified by friction in its thousands of forms. The invert gradient of a sewer is one element in the law of flow. The head of water and delivery are other elements, giving velocity and scouring power. I only object to tables of sectional dimensions for general use. The town of Alnwick, in Northumberland, with its 2,000 acres of drainage area, its 7,000 population, and some 1,000 water-closets, is sewered by an earthenware pipe 18 inches diameter, and having a gradient of 1 in 400. Carlisle, with its 1,900 acres of drainage area, and 35,000 population, has an outlet sewer of 3 ft. 9 in. by 2 ft. 6 in., with a fall of 1 in 700.

At Workop the outlet sewer is an earthenware pipe, 15 inches diameter, laid at an inclination of 1 in 600. The population is upwards of 7,000, and the drainage area very large.

At Lancaster the outlet sewer is of brick, 5 ft. 3 in., by 3 ft. 6 in., and laid at an inclination of 1 in 1,000. The population is about 15,000, and the drainage area considerable, having a rapid fall in some parts.

At West Ham, with an area of 4,730 acres principally of flat water-logged marsh land, the outlet sewer is of brick, 5 ft. 3 in. by 3 ft. 6 in., having a cast-iron invert laid level, and at low-water line of spring tides.

In all these cases the dimensions of the outlet sewers do not accord with the tables alluded to, and yet the sewers perform the work required to be done. Surface water and heavy falls of rain pass, as previously, over the surface, but there is not a duplicate system, nor do I advocate such.

At Carlisle the outlet is frequently blocked by land-floods; at Lancaster, daily, by tides; and at West Ham pumping is resorted to.

The first questions an engineer should ask himself with respect to any district or area to be sewered should be these:—"How have surface waters passed off up to this time without the aid of sewers or drains?" "Have any surface impediments been formed; if so, what are the effects, and can such impediments be removed?" "Have houses been erected and cellars excavated in improper places, and where injurious flooding cannot be prevented excepting at a ruinous cost to the rated property of the district generally?" "Can watercourses in the valley lines be deepened at a moderate cost?" and, "Can embanking and pumping be resorted to economically?" "Are there any mills and mill-dams which impede drainage and cause injurious subsoil—flooding regularly, and injurious flooding at intervals?" All these questions have a most important bearing on the dimensions of sewers.

It may look very egotistical, but I can better give an account of my own practice than that of any other person, and detail my own experience more confidently than stereotype it in tables, which must, in such form, be misleading and injurious.

Natural streams down valley lines should never be converted into sewers. The maximum flow of water in such streams is to the minimum as three hundred or four hundred to one. Any sewer formed in such valley line of sufficient capacity to carry off flood waters, would be much larger than requisite for the ordinary flow, and would become a cause of nuisance in dry weather. All valley lines should be improved, and the beds of natural streams should be preserved free and open for the escape of surface and flood waters. Sewers and drains should be of sufficient capacity to remove roof, yard, street soil, subsoil, and slop-water from the area drained during ordinary weather, and should be graduated to the amount of work to be done. Flood-water outlets or overflows into valley lines, or natural

streams, to relieve the sewers during heavy rains, should be provided. There may be large gratings to remove surface storm waters at the outlet points of valley lines, but care must be taken not to make such places large stagnant cesspits.

All sewers and drains should be properly ventilated. This may be effected by connecting down-spouts with house-drains in proper situations; by connecting sewers with tall chimneys; or by providing, on the sewers and drains, ventilating shafts with charcoal filters for oxidising sewer-gases. All sewers should have means of inspection, flushing, and cleansing provided. Sewers should be laid in straight lines, and with regular gradients. At each alternate change in direction, or alteration of gradient, a manhole or entrance to the sewer should be constructed. Agricultural drain tiles are laid in straight lines. Ploughing, on the most approved plan, is also in straight lines. In both cases, truth and efficiency of workmanship are attained, and straight sewers and drains insure good workmanship. One defective link breaks the chain; one defective pipe-joint or defective yard of sewer is injurious.

Brick sewers should be formed of radiated bricks, set in hydraulic mortar. Pipes should be jointed with clay-puddle, or with cement, or mortar, or asphalt, according to the nature of the ground in which the pipes are laid. Great care should be taken in laying pipes in rock, in gravel, and also in clay. Many lines of sewer pipes are injured by injudicious filling of a trench, or by a fall of clay or earth crushing the pipes. The inlets of all drains should be properly protected, and the openings should be reduced so that any substance entering the drain may pass freely into the main sewer.

Where a sewer or drain has once choked, and the ground is opened out for repairs, do not close it in again, but construct a manhole or lamphole, that any future obstruction may be removed at once.

Sewers and drains act as subsoil-drains to the full depth at which they are laid. In wet subsoils provision should be made for allowing subsoil-water to enter the sewers. A continuous flow of subsoil-water along a sewer or drain is generally an advantage, as the solids of sewage are more readily removed.

Neither sewers nor drains should be laid under new inhabited dwellings. If it be absolutely necessary to carry a drain under a house, the drain should be carefully laid, and the joints made perfectly tight, so as to prevent the escape of sewer gases into the adjoining subsoil. Many lines of earthenware pipe sewers and drains are ruined when laid in porous subsoils with leaking joints. The fluid sewage leaks away, and leaves the solids to accumulate and ultimately to choke the sewer or drain, as the case may be. Puddle should be used in such cases.

All junctions with main sewers should be made at a point above the ordinary water-level in such sewers; and at the junction of branch or main sewers, the top of the sewers should be on the same level. Additional fall should be given at junctions or bends, to overcome increased friction. Junction entrances, provided for branch sewers and house drainage, should be protected by earthenware plates, or "disc-plugs." Street gullies should be small, compact, and double-trapped. There should be a sediment box, easily removed and easily replaced. Means of flushing should be provided in the gully, that choking of the pipe connection with the sewer may be impossible. Large cesspit gullies are a nuisance. Small gullies of cast-iron are generally found the cheapest and best; increase the number of small gullies, rather than construct large cesspit gullies.

Fresh sewage, when properly diluted, filtered, or disinfected, may be passed into rivers, or into the sea, without causing nuisance or injury to fish. In arranging outlet sewers, provision should be made for applying the sewage to land in the immediate neighbourhood, for agricultural uses, by gravitation if practicable. Pumping by steam or other power is available. A town standing on ground having quick gradients requires special arrangements to

break the rush of water down and of gases up. This can be done by breaking the line with a vertical fall, placing a flap over the mouth of the sewer, and ventilating at this point. The outlet ends of all sewers should be protected with a covering flap, to prevent the wind blowing in and driving back sewage gases. A cast-iron pipe of comparatively small dimensions on any river outlet-sewer, will pass the dry weather flow of sewage to and below the summer level of the river, so as not to be a nuisance.

It is not the special province of an engineer to enter into the question of diseases and their causes. There are many causes of disease other than filth, the result of no sewerage, or of defective sewerage; and even fevers may break out in a sewered town. Deficient and bad food, defective house accommodation and overcrowding, intemperance, and excesses of any kind, mental excitement, improper and deficient clothing, all tend to disease. The foundation of social improvement and comfort is, however, proper sewerage. The scale may be arranged in the following order, as things necessary in towns for health and comfort to the highest degree:—

1st. Main-sewerage, house-drainage, and street-pavements.

2nd. Good house-accommodation; rooms for the sexes, separate, with full ventilation.

3rd. Wholesome food, pure water, and proper clothing. Then may be added, baths, reading-rooms, and museums.

A city of palaces, museums, picture-galleries, and of cesspools, is a sorry affair—a place to avoid rather than to dwell in. The cesspools of Paris detract from the beauties of the city above ground; and who is to visit and dwell in the cities of the Continent generally, if they remain neglected? Climate is blamed for producing disease in excess and premature death, but my experience has taught me that in any country and climate we must look to the habits of the people, and within their houses, rather than to the climate, for causes of disease in excess.

The cost of town sewerage works is an important matter; and as continental governments look to England, and especially to the British metropolis, it is only right that they should have some sort of rule to judge by. In my experience I find that towns of and below 30,000 of population may have complete sewerage at or below one pound sterling per head. Where a population is compacted into a small area, and means of outlet are not distant, as in the cities on the Rhine, the estimate of one pound sterling may be relied on. But large brick sewers, for men to walk and work in, must not be constructed. The sewers must be of small sectional area, and so arranged that they may be cleansed absolutely and perfectly without sending men in and through them.

All rivers and streams are natural outlets for drainage, and since men have dwelt on the banks of rivers, surface refuse has been allowed to pass into and mingle with the waters. There is at present a great outcry against the pollution of rivers by sewers, and the killing of fish. The questions may be asked, "Whether is it better to pollute rivers, or towns and houses? to kill fish, or to kill men?" I do not advocate the pollution of rivers, but the application of sewage to land for agricultural uses. If it will not pay, in some cases, as a commercial speculation, make it compulsory, and pay the cost by rate. By far the most expensive process in any community is filth in cesspools beneath houses, or on the surface around human dwellings.

Proper sewers and drains deliver sewage at the outfall fresh, and in this state fish are not killed, but are fed. The putrid sewage flushed from the foul sewers of the metropolis during hot weather by a thunder storm, taints the river and poisons fish; but even in the hot summer of 1859 the mortality in London was low, although the Thames was foul. As cesspools have been abolished, the public health has improved, and if all the sewers were of sectional dimensions, forms, and gradients (as they may be) to transmit fresh sewage, and not retain it until putri-

faction sets in, the public health would be further improved. It is practicable to so improve and manage the public sewers of this metropolis, that sewage one day old shall not remain, but shall be in motion towards some outlet; and in motion there is safety, but danger in stagnation.

The full and proper ventilation of sewers and drains is of the utmost importance; drains should be so laid and arranged as to render contamination of the air within houses (by sewage gases) impossible. At present, the sewers of the metropolis, with exceptions in the City, as recorded by Dr. Letheby and Mr. Haywood, ventilate, for the most part, direct to the open air, by means of the vertical shaft from the crown of the sewer. The gases of decomposition rise direct out, and road dirt, stones, and grit fall in. The gases foul the air in the street, and the dirt, ground by traffic through the open grates blocks the invert of the sewers. The proper way to ventilate is to form a side-chamber, or side-shaft, and to place charcoal in the passage of communication from the vertical shaft by the side-chamber, so that all the gas escaping may be oxidised. The side-chamber receives the dirt falling through the ventilating-grate; it cannot enter the sewers. House-drains may also be ventilated in a similar manner.

Dr. Stenhouse pointed out the true uses of charcoal in 1853. I commenced the use of charcoal for sewer ventilation about the year 1858; and Dr. Letheby and Mr. Haywood commenced their elaborate and valuable experiments also in 1858. I think I may claim to have been one of the first, if not absolutely the first, to apply the use of charcoal for disinfecting the sewage gases of an entire town, upon a general plan, as part of a sewerage system. I may instance Workop, Buxton, and West Ham.

Cesspools may be ventilated through charcoal with advantage, where they cannot be abolished entirely, which is the only safe remedy. At the County Hospital, Winchester, a large cesspool, some eight feet diameter, is ventilated through a covering of charcoal. The arch covering of the cesspool was removed; a wire-work basket, about ten feet square, supported on iron framework, covers the entire area of the cesspool, and this is filled with charcoal, broken fine (like peas), to a depth of twelve inches. There is a roof over the charcoal to prevent its being wetted by rain, and the whole is walled in so as to leave a clear passage round. It is reported to answer fully—there is certainly no nuisance from cesspool gases at this point.

The following are details of sewerage works executed:—

CARLISLE.

The "drainage area" of the district sewered is about 2,000 statute acres.

The main outlet sewer for the entire area is 3 ft. 9 in. by 2 ft. 6 in. The sewer is laid with a gradient of 1 in 700. The outlet is extended to the centre of the river Eden, so as to deliver the sewage into the water of the river in the driest weather. The main-sewer, and the low-lying portions of the city, may be relieved by flood-outlets, of the drainage of 1,930 statute acres.

The "drainage areas" of the several "flood-outlets" may be described as under:—

	Areas in acres.
1. Swift's-lane	330
2. Bitt's-bank... ..	50
3. Castle mill... ..	170
4. Dow-beck and Milbourn	750
5. Paddon-beck and Newtown	630

Total area in statute acres. 1,930

The surface was most carefully considered, and all available means were used to prevent damage or inconvenience from local storms and flood-waters. The main sewers and secondary branches are built of bricks, moulded to the sectional form required for each sewer, and set in engine-ground hydraulic mortar.

Cast-iron pipes were used in crossing under rivers and

watercourses and for the main low-water outlet. The means of flushing from surface waters are full and ample. Flushing-valves or sluices are provided on the Caldew, the Eden, Mill-beck, &c., and from a flushing-chamber in English-street (the highest part of the city), the sewers in 28 streets in every direction may be flushed.

The sewers are designed to remove all sewage refuse without pumping. This will be accomplished completely at all ordinary times. An extraordinary flood may block the outlet, and a long-continued rain may then, for a short time, fill the lower sewers, simply because the surface waters impede all action; at such time the largest sewers would be filled, and, for a time, their delivery would be impeded. There have been as heavy floods in the district since the completion of the works as any previously recorded, causing no injury to the sewers. There has been local flooding, but no one blames the sewers as the cause.

The following are details of expenditure:—

BRICK SEWERS.									
Size of Sewer.		Length in yards.	Average Cost per yard.		£ s. d.		£ s. d.		
ft. in.	ft. in.		s. d.		£	s. d.	£	s. d.	
3 9	2 6	2,285	29	1½	3,326	19	10		
3 4½	2 3	1,993½	24	8	2,455	6	8		
3 0	2 0	1,385½	21	6	1,491	16	2		
2 3	1 6	3,209	16	6	2,644	0	11		
Total Length of } Brick Sewers..		8,873 yds.			Cost.....		9,918	3	7

EARTHENWARE PIPE SEWERS.									
ft. in.		Yards.	Cost.		£ s. d.		£ s. d.		
			s. d.		£	s. d.	£	s. d.	
1 6		646	9	7	310	2	4		
1 3		4,352	8	5½	1,842	6	4		
1 0		6,509	6	8	2,167	11	9		
0 9		2,509	4	10	608	18	0		
0 6		168	3	10	32	4	0		
Total Length of } Earthenware Pipe Sewers..		14,184 yds.			Cost.....		4,961	2	5

CAST-IRON SEWERS.									
ft. in.		Yards.	Cost.		£ s. d.		£ s. d.		
			s. d.		£	s. d.	£	s. d.	
2 3		297	61	3½	910	3	2		
1 6		677	29	0	981	6	9		
1 0		48	13	2	43	10	9		
Total Length of } Cast-iron Sewers..		1,022 yds.			Cost		1,935	0	8
							£16,844	6	8

SUMMARY OF SEWERS.

		Length in Yds.	£ s. d.		£ s. d.	
			£	s. d.	Total Cost.....	
Brick Sewers	8,873		9,918	3	7	
Earthenware Pipe Sewers.....	14,184		4,961	2	5	
Cast-iron Sewers.....	1,022		1,935	0	8	
Total length		24,079			16,814	6 8

MAN-HOLES.

		No.	Average Cost.		£ s. d.	
			£	s. d.	£	s. d.
On Brick Sewers	67	21	4	7	1,422	7 7
On Earthenware Sewers	60	7	1	1½	423	8 0
On Cast-iron Sewers.....	4	9	1	11	36	7 8
Total Man-holes ...		131			Cost.....	1,882 3 3

LAMP-HOLES.

		No.	Average Cost.		£ s. d.	
			£	s. d.	£	s. d.
On Brick Sewers	18	34	6½		31	1 9
On Earthenware Sewers	79	37	11½		149	18 6
On Cast-iron Sewers.....	2	65	3		6	10 6
Total Lamp-holes... ..		99			Cost.....	187 10 9
Gullies	366	59	0		1,086	2 0
Flood Outlets					445	16 9½
Flushing Valves and Sluices					311	14 6
Crossing Rivers, and Sundry Expenses					747	3 7½

Engineer in Chief	21,504	17	7
H. McKie, Resident Surveyor, and Inspectors of	1,150	0	0
Brickwork, &c.	505	9	0
Incidental Charges, say.....	150	0	0
		23,310	6 7
Rateable Value...£60,378	7 9		
Number of Houses about 6,838			
		Annual Rate in the Pound required	
		to repay Principal and Interest	
		in 50 Years, 6d.	

The cost of draining "self-contained" houses, including one water-closet, was	about £6	2	1
The same, without a water-closet, about	5	6	4
The cost of draining "tenement houses" with one water-closet for each house, taken on an average of 71 tenements, was, per tenement	1	6	7
The cost of draining "tenement houses" without water-closets, taken on an average of 66 tenements, was, per tenement	1	10	0

Where a water-closet has not been used, a cess-pit has been drained, and the drain is laid at a greater depth, in-

volving larger cost. Where a water-closet has been used, the cess-pit has been filled up.

All cess-pits should be abolished, as nuisances, which draining only ameliorates, but does not cure.

WORKSOP.—GENERAL DESCRIPTION OF WORKS.

The outlet-works consist of six trenches about 200 feet long, three feet deep, and eighteen inches wide at the bottom, with side slopes of one to one. These trenches are provided with sluice-arrangements at each end, to allow of the sewage being diverted as may be required, either for cleansing the trenches or for other purposes.

At the termination of the outlet-sewer provision has been made for passing limewater, or other disinfecting fluid, into the sewage, and moveable screens, for inter-

WORKSOP MAIN SEWERAGE WORKS.
PARTICULARS OF COST.

DESCRIPTION OF WORKS.	Quantities.		Average Cost per yard.	Cost.		Amount.
	Cub.yds.	Cub.yds.		£ s. d.	£ s. d.	
BRICK SEWERS—						
2 ft. 0 in. diameter. 9 in. thick	64	..	0 19 9 ¹ / ₄	63 5 3		
2 ft. 3 in. by 1 ft. 6 in. 4 ¹ / ₂ in. „	950	..	0 13 8	648 17 1		
Total Brick Sewers ... ..	..	1,014	..	..		712 2 4
EARTHENWARE PIPE SEWERS—						
15 inches diameter	3,695	..	0 5 3	970 0 4		
12 inches do.	4,084	..	0 4 6 ¹ / ₂	929 14 0		
9 inches do.	3,537	..	0 3 2	560 2 3		
Total Earthenware Pipe Sewers... ..	..	11,316	..	..		2,469 16 7
CAST-IRON PIPE SEWERS, for crossing canals and rivers, including cost of retaining walls, puddle, pitching, &c.						
15 inches diameter	69	..	2 13 5 ¹ / ₄	184 7 8		
12 inches do.	18	..	3 5 2	58 13 0		
9 inches do.	12	..	1 13 0	19 16 0		
Total Cast-iron Pipes ... ..	..	99	..	..		262 16 8
TOTAL LENGTH OF SEWERS ... ..	..	12,429 or 7 miles 109 y.				
Manholes	Number.	Each.				
Lampholes	75	6	508 2 9			
Gullies, with drains complete	48	0 ¹ / ₂	98 9 9			
Three Flushing Chambers and three Overflows	136	1 11 ¹ / ₄	285 3 8			
Ventilating Shafts	6	8 ¹ / ₂	28 2 3			
	51	6 ¹ / ₂	93 4 3			1,013 2 8
Outlet Works complete .. ..	..	..	..	..		257 1 4
Timber and Concrete in trenches ... ..	..	..	..	57 15 4		
Disc Plugs and fixing ... ..	..	..	..	7 17 0		
Making connections with old Sewers, &c. ... ..	..	..	..	18 3 11		
Assistance in levelling and sundry expenses ... ..	..	..	..	13 12 10		
Land and Compensation ... ..	..	..	..	..		97 9 1
Rent of Pipe-yards and sundry expenses ... ..	..	..	..	..		331 19 6
Advertising and Stationery, &c.... ..	..	..	..	..		3 16 4
Law expenses ... ..	..	..	..	..		28 13 9
R. Rawlinson, Engineer ... ..	..	..	..	394 3 0		20 19 9
W. McLansborough, Resident Engineer—Salary, office rent, and expenses... ..	..	..	..	279 18 7		
						674 1 7
Total Cost						5,871 19 7

N.B. Earthenware pipes, 15 inches in diameter, were delivered at Worksop at 11d. per lineal foot ; 2s. 9d. per yard.

cepting solid matter, have been placed in the trenches. Two outlets for filtered sewage-water are provided into the river Ryton. The area sewered is about 400 statute acres.

The sewer from Bridge-street to opposite Beaver-place is of brick, egg-shaped, 2 ft. 3 in. by 1 ft. 6 in. At the termination of the brick sewer an overflow into the river Ryton is provided, and from this point to the outlet works the sewer is formed of 15-inch earthenware pipes, cast-iron pipes of the same diameter being laid across the river and mill stream. The outlet sewer has a fall 1 in 600. This outlet serves for the entire district. The sewers are formed principally of stoneware pipes of 15, 12, and 9 inches diameter. The manholes and lampholes are furnished with moveable covers to admit of the sewers being examined. The ventilating-shafts are fitted with charcoal-filters, through which the sewer gases are passed and thereby oxidised. Seventy-five manholes, 48 lampholes, and 51 ventilating shafts are provided on the sewers.

Manholes throughout the entire system are provided with grooves for flushing sluices, and, in addition to these arrangements, flushing-tanks have been constructed at the upper ends of the sewers. Connections, for flushing purposes, have also been made with the open drain or water-course in Chesterfield-road, and with the canal near East-gate.

136 gullies (including five for storm waters) are fixed within the district. The gullies are double-trapped, and are so constructed as to prevent road dirt and solid substances passing into the sewers. Two overflows for storm waters have been provided near Beaver-place, and one for Low Town main.

Sewers are laid under the Chesterfield canal at two points, and over and under the river Ryton, and the canal feeder at seven points. In all cases the crossings have been made with cast-iron pipes of 15, 12, or 9 inches diameter.

The site on which Workop is built presents several natural and artificial difficulties to cheap sewerage works. The valley is flat and liable to rain-floods; the river had to be crossed several times, as also the canal on one side, and the canal feeder on the other. The outlet works are simple in plan and economical in cost. Expensive tanks have been avoided, and the cheapest, but most effectual, means for intercepting and removing any solid, flocculent, or discolouring matter have been adopted. The experience of two summers has shown that these works are efficient.

The proper place for liquid sewage, however, is the land, and the best filter is vegetable soil under full cultivation; but when the sewage is so used at Workop, the existing outlet works will be necessary, as it is advisable to intercept any floating solids and to irrigate with the fluid above.

The entire of the sewage of Workop may be carried on and over the land below the outlet works very cheaply, by contour conduits, and be distributed by surface irrigation. A small outlay on such works, and intelligent management in irrigating and growing appropriate grasses, will prove beneficial to the farmer.

The entire system of sewers in Workop is fully ventilated by special arrangements for this purpose at 51 places, and these include all upper ends of sewers. The estimated cost of the works was £6,000; the actual cost, including all contingencies, was £5,871.

BUXTON.

DESCRIPTION OF SEWERAGE WORKS.

OUTLETS.

Two outlets for sewage have been formed into the river Wye; one near Wye-bridge, and the other opposite Duke's drive. The outlet sewers are so arranged with regard to levels as to allow of the whole of the sewage being applied, by gravitation, in irrigating the land in the valley of the Wye.

SEWERS, &c.

The district for sewerage purposes has been divided into

two "drainage areas," the main sewer for each sub-district being formed of 15-inch stoneware pipes.

In many portions of the town the sewer excavations were made, wholly or partially, in limestone rock. In such cases the trenches were excavated six inches below the proposed level of the sewer, and a properly prepared bed was formed for the pipes by filling in the trench with clay, gravel, or sifted earth. Manholes and lampholes have been provided at all the changes of direction or alteration in gradient of the sewers. Flushing chambers have been constructed at the upper ends of the sewers, and provision has also been made for flushing from the baths and from the river.

The sewers from "High Buxton" have gradients of about 1 in 10. Overflows into the river Wye, for relieving the sewers during heavy rains, have been formed at river crossings and other suitable points. Ample means have been provided for ventilating the sewers by about thirty shafts furnished with charcoal filters.

My estimate for the public sewerage works of the district was £3,203. The actual cost of the works as carried out was £3,107 6s. 10d.

SEWERAGE WORKS.—PARTICULARS OF COST.

EARTHENWARE PIPES.	Quantity.	Average Cost.	Amount.
	Lineal yards.	£ s. d.	£ s. d.
15 inches diameter	1,590	0 8 3	657 11 9
12 inches do.	2,522	0 6 0	756 19 2
9 inches do.	2,151	0 4 6	483 10 8
Total Length of Sewers.	6,263		
	Number.		
Manholes	45	11 11 0	520 17 4
Lampholes	35	5 11 0	196 1 9
Gullies	20	3 2 0	62 0 0
Cast-iron Pipes for crossing river outlet works and sundry works in connection with sewers—Compensation, &c.	—	—	46 1 2
Engineering & Superintendence.	—	—	384 5 0
			3,107 6 10

WIGAN.

Mr. John Law Hunter, borough surveyor, has given me the following information as to drainage in Wigan:—

The average cost of draining cottages of about £3 or £4 rental, has been at an average of.....	£1 1 0
Ditto ditto £7 or £8 rental.....	1 11 0
Ditto ditto £14 or £15 rental	1 13 6

4,228 houses have been drained at a total cost of £8,796 19s. 10d., or an average cost, per house, of £2 1s. 4d.

In draining 4,228 houses, 36,960 lineal yards of earthenware pipes have been used, being an average of 8½ yards per house. The earthenware pipes used are from 9 inches to 4 inches internal diameter.

Many of the drains have been in use several years, and there have not been any complaints of choking or stoppages.

Water-closets are not in general use in Wigan, but cess-pits, yards, stables, and house-sinks are drained. A general use of earthenware-pipe drains prevents rats living in the sewers and drains. They have neither food nor means of shelter.

DISTRICT OF WEST HAM, ESSEX.

PUBLIC SEWERAGE WORKS.

The parish of West Ham consists of the sub-districts of Stratford, West Ham, and Plaistow, and comprises an area of about 4,735 statute acres.

Population about 35,000, but is rapidly increasing. Annual rateable value, £135,000. The entire area is low and flat. The lowest surface area is near Hallsville, and is about four feet above Ordnance datum.

The highest surface area is near Forest-gate, and is about forty-five feet above Ordnance datum. The difference of level within the parish is, therefore, about forty-one feet.

A considerable portion of the parish is marsh, protected, by artificial embankments, from tidal waters and land floods, which rise to a height of from six to ten feet above the surface of the land.

This marsh land is intersected by ditches, and is under the jurisdiction of the Havering and Dagenham Commissioners of Sewers.

The distance from the outlet works to the end of the sewer near Forest-gate is about three and a-half miles; at Bow-bridge two-and-a-half miles; in Romford-road, two miles and three-quarters; in Barking-road, one mile and three-quarters; and in the Lilliput-road, Victoria Docks, one mile and a half.

The outlet works consist of a pumping establishment and a low water, or relieving flood-water sewer.

The pumping establishment is erected on land purchased by the Local Board at Canning-town, and consists of an engine-house, boiler-house, coal-store, work-shop, and engine-chimney, with pumping-wells, outlet-wells, and outlet-pipes.

Two condensing engines (of 40-horse power each), having 34-inch cylinders, and 6-feet stroke, have been provided and fixed. Each engine works two pumps of 48 inches diameter, and 3-feet stroke. The two engines are capable of lifting 30,000,000* gallons in 24 hours. The pumps are so arranged as only to lift to the level of the water in the river; the lowest lift is 8 feet, the highest lift is 22 feet.

The inlet and outlet pipes, to and from each set of pumps, are 30 inches diameter, having screw-down valves complete. Self-closing flap-valves are fixed on the outlet pipes at the river wall.

A low-water, or relieving flood-water outlet has been formed at Bow-creek, near Barking-road station. The river Lea at this point is nearly four feet lower, at low water of spring tides, than the bed of the river opposite the pumping works. This outlet, which is self-acting, discharges the flood-water for several hours each day without pumping. In the outlet-well adjoining the river, two self-closing flap-valves, similar to those at the pumping-outlet have been fixed, and, as a precautionary measure, one screw-down sluice has been placed in the manhole in Barking-road.

The larger main sewers are formed of brickwork; smaller sewers are of stoneware pipes. Cast-iron pipes have been used for crossing navigable rivers, and also for crossing marsh drains, and for the main outlets. Brick sewers are "egg shaped" on section, and vary in size from 5-feet 3 inches by 3-feet 6 inches, to 2-feet by 1 foot 4 inches. The whole of the brickwork is set in the best blue lias hydraulic mortar. Stoneware pipes are circular on section, and have half-socket joints. Cast-iron pipes are circular on section, and are formed with flanch or socket joints. Twenty-four thousand two hundred and twenty-seven (24,227) lineal yards of brick sewers; twenty seven thousand six hundred and ninety-eight (27,698) yards of stoneware pipe sewers; and two hundred and ten (210) yards of cast-iron pipes, making a total of fifty-two thousand one hundred and thirty-five (52,135) lineal yards, or twenty-nine miles and one thousand and ninety-five yards (29 miles 1,095 yards) have been constructed and laid within the district.

The sewers, throughout the district, have been designed with a view of obtaining the best practicable gradients,

more especially for tributaries. In some cases, however, it has been necessary to lay the mains with a fall of not more than one in 3,520, or 18 inches per mile.

The sewers, on plan, have been laid in straight lines; and, on section, with regular gradients. At each change in direction, or alteration of gradient, a manhole or lamp-hole has been constructed, affording means for inspecting, and, when necessary, also for cleansing the sewers.

The main outlet-sewers in Canning-town have been laid level, and the inverts are formed of cast-iron, to allow of their being laid and formed under water.

Considerable difficulties were experienced in the construction of the sewers in some portions of the district, arising from loose, wet, spongy, and other unfavourable descriptions of sub-soil, and from other causes. Upwards of three miles of main sewers have been laid with cast-iron inverts, at or near the level of low water of spring tides, at the Barking-road outlet.

About 9,000 junctions for branch-sewers and house-drains have been provided on the main and tributary sewers. A careful account has been kept of these junctions, and has been placed in the hands of the Surveyor to the Board.

The main-sewer crossings, under three branches of the river Lea, consist of cast-iron pipes of two feet six inches, and two feet diameter. At each end of these cast-iron pipes under the rivers, a manhole is constructed with screw-down sluices, which may be put down in case of injury to the pipes under the rivers, and thus prevent flooding in the low districts.

The river-crossings were executed by Mr. Munday in a manner perfectly satisfactory to myself, and highly creditable to the contractor. By staging over the rivers, jointing the pipes, dredging the lines of mains, and lowering each entire length of pipe to its position, stoppage of traffic was rendered unnecessary, and claims for compensation, which might otherwise have arisen, were, by these arrangements, prevented.

Main and branch sewers have been constructed under the North Woolwich, the Barking and Tilbury, and Eastern Counties Railways, in eight separate places. The railway companies and their engineers afforded every facility for executing the works, and the crossings were completed without accident or stoppage of traffic.

On the sewers, as executed, there are 468 manholes, or means of access from the surface to the sewers for examination, for flushing, and, when requisite, for cleansing; and 197 lamp-holes for means of inspection, making, on an average of the entire length, one opening to the sewers from the surface of street or road, at about each seventy-eight lineal yards. Manholes have step-irons, flushing-grooves, and moveable iron covers complete. Lamp-holes have moveable iron covers. There are 251 ventilating-shafts provided on the sewers. These shafts are so arranged as to prevent road-drift falling into the sewers and impeding the flow. Sewer-gases are passed through wire baskets containing charcoal, and by this means are rendered innoxious. Seven hundred and eighteen (718) gullies have been fixed within the districts. The gullies are so constructed as to prevent solid or other improper substances passing into the sewers.

Flushing arrangements are of three classes:—First, by the admission of water into the sewers through sluices, hose-pipes, or valves; second, by screwing down fixed sluices built in certain manholes, allowing the sewage water to accumulate, and suddenly raising the sluice; and, third, by inserting loose paddles in the grooves provided in nearly all the manholes. Thirteen flushing valves and forty-two flushing-sluices are fixed in the sewers. By one or other of these arrangements, the whole of the sewers within the district may be flushed. About 310 feet in length of river wall has been put in, bounding the land belonging to the Local Board. This wall is constructed of brick and concrete, coped with stone, and is sound, firm, and calculated to be enduring. A wharf has been formed, at which coals for the engines are landed, but there is space for other traffic.

* 30,000,000 gallons, equal to 300,000,000 lbs., or 133,928 tons.

WEST HAM.—PARTICULARS OF COST.

		Amount.		Total.	
		Yds.	Yds.	£ s. d.	£ s. d.
BRICK SEWERS.					
Ft. in.	Ft. in.				
5 3 by 3 6	1117	...	...	3901 6 10	
4 6 " 3 0	2562	...	...	7476 4 0	
3 9 " 2 6	1463	...	...	4055 9 3	
3 0 " 2 0	7588	...	...	12376 7 11	
2 6 " 1 8	3182	...	...	5566 7 7	
2 3 " 1 6	8231	...	...	9156 17 11	
2 0 " 1 4	84	...	...	59 15 6	
Total Brick Sewers.....	24227	.....	.....	42622 9 0	
EARTHENWARE PIPE SEWERS.					
15 inches diameter	10646	...	...	6671 14 11	
12 " "	16564	...	...	7061 2 10	
9 " "	488	...	...	142 12 7	
Total earthenware pipe sewers.....	27698	.....	.....	13875 10 4	
Cast-iron pipes for river crossings, &c.....	210	.....	.....
Total length of sewers ... or 29 miles 1095 yards.	52135	No.	No.		
Manholes & ventilating shafts ...	232	...	...	3455 5 4	
Manholes	236	...	...	3160 4 3	
Lampholes & ventilating shafts..	15	...	...	97 8 3	
Lampholes	182	...	...	1098 9 8	
Gullies & pipes fixed complete...	665	...	...	7721 7 6	
.....	718	...	...	3185 14 5	
Outlet works, pipes, valves, &c.	.....	.....	.....	1754 14 5	
River wall, wharf, and roads, at engine-house, and repairing roads .....	.....	.....	.....	2677 9 2	
Engine-house, boiler-house, chimney, and other works in connection therewith .....	.....	.....	.....	5098 6 10	
River crossings .....	.....	.....	.....	1644 6 7	
Engines, boilers, and pumps .....	.....	.....	.....	3978 9 10	
COST OF WORKS.					
Engineering and superintendence ...	6161	9 8	82558	8 1	
Land and compensation, and law charges ...	2999	8 8			
Coals and tallow, &c., for engines ...	303	5 3			
.....			9464	3 7	
Total cost			£ 92022	11 8	

N.B.—This amount includes purchase of implements, tools, and materials in the hands of the Local Board.

ALNWICK.

FIRST CLASS HOUSE.—RENTAL £40 PER ANNUM.

WATER SUPPLY.		Price not Fixed.	Price Fixed.	Total Cost Fixed.
		s. d.	s. d.	£ s. d.
143 lineal feet of 1 inch galvanised tube...	0 7 1/2	0 10 1/2	6 5 1	
56 " 1/2 " "	0 5 1/2	0 8 1/2	2 4 8	
34 " 1/2 " "	0 4 1/2	0 7 1/2	1 1 3	
16 in. of lead pipe for water closet pan...	0 10	...	0 0 10	
3 in. of india rubber tubing for ditto...	1 1	...	0 1 1	
1 1/2 in. self-closing ferrule cock for do...	7 4	...	0 7 4	
1 1/2 in. elbow ferrule with union joint...	3 10	...	0 3 10	
1 1/2 in. elbow piece	1 6 1/2	...	0 1 6 1/2	
2 1/2 in. "	1 0	...	0 2 0	
5 1/2 in. "	0 7 1/2	...	0 3 1 1/2	
1 1/2 in. socket piece	1 1	...	0 1 1	
2 1/2 in. "	0 8	...	0 1 4	
2 1/2 in. "	0 6	...	0 1 0	
1 1 to 1 1/2 in. taper piece	1 1	...	0 1 1	
1 1/2 in. T-piece	1 7	...	0 1 7	
2 1 to 1 1/2 in. T-pieces	1 7	...	0 3 2	
1 1/2 in. stop-cock	7 11	0 6	0 8 5	
1 stop-cock case	4 6	1 6	0 6 0	
1 1/2 in. screw plug, 9d., 1 1/2 in. do., 4 1/2 d.	1 1 1/2	...	0 1 1	
1 1/2 in. bib tap	2 10	0 6	0 3 4 1/2	
				11 18 11 1/2
SEWERAGE.				
211 lineal feet of 6-in. earthenware pipe	0 5 1/2	Price varies according to depth.		
68 " 4-in. " "	0 4			
6 " 6 to 4 in. junction pipe	1 6		12 0 9	
3 " 6 to 6 in. " "	1 6			
1 " 6 to 4 in. taper pipe	1 4			
2 " 6 in. bend pipe	1 6			
1 water closet pan and fan, old seat refixed	8 6	17 0	0 17 0	
3 earthenware yard sinks	6 0	9 6	1 8 6	
2 6-in. bell traps	2 6	8 6	0 17 0	
Sewerage .....	...	...	15 3 3	
Water .....	...	...	11 18 11 1/2	
Total .....	...	...	27 2 2 1/2	

SECOND CLASS HOUSE.—RENTAL £15 PER ANNUM.

WATER SUPPLY.		Price not Fixed.	Price for Fixing.	Total Cost Fixed.
		s. d.	s. d.	£ s. d.
6 lineal feet of 1/2 in. galvanised tube ...	0 4 1/2	0 3	0 3 9	
72 " 1/2 in. " "	0 5 1/2	0 3	2 9 6	
16 in. lead pipe for water closet pan ..	0 10	...	0 0 10	
3 in. india rubber tubing for ditto...	1 1	...	0 1 1	
1 in. self-closing ferrule cock for do...	7 4	...	0 7 4	
1 in. elbow ferrule, with union joint ...	2 3 1/2	...	0 2 3 1/2	
3 in. elbow pieces	1 0	...	0 3 0	
2 in. "	0 7 1/2	...	0 1 3	
7 in. socket pieces	0 8	...	0 4 8	
3 in. "	0 6	...	0 1 6	
1 to 1 1/2 in. T-piece	1 2	...	0 1 2	
1 in. bib tap	3 4	0 6	0 3 10	
1 1/2 in. stop cock	5 2	0 6	0 5 8	
1 stop cock case	4 6	1 6	0 6 0	
				4 11 10 1/2
SEWERAGE.				
47 lineal feet of 6 in. earthenware pipe ...	0 5 1/2	Price varies according to depth.		
12 " 4 in. " "	0 4			
7 " 6 to 6 in. junction pipes..	1 6		4 0 1	
2 " 6 in. bend pipe	1 0			
1 " 4 in. bend pipe	1 0			
5 " 4 to 6 in. taper pipe	1 4			
3 earthenware sinks	6 0	3	1 8 6	
2 6-in. bell traps, with earthenware dishes	2 6	5 0	0 10 0	
1 water closet pan and fan, with new seat	8 6	14 0	1 2 6	
1 ash pit, filled up and repaved	5 0	...	0 5 0	
Additional clay puddle in passage .....	...	...	0 5 0	
Sewerage .....	...	...	7 11 1	
Water .....	...	...	4 11 10 1/2	
Total .....	...	...	12 2 11 1/2	

THIRD CLASS HOUSE.—RENTAL £7 PER ANNUM.

WATER SUPPLY.		Price not Fixed.	Price for Fixing.	Total Cost Fixed.
		s. d.	s. d.	£ s. d.
10 lineal feet of 1/2 in. galvanised tube ...	0 5 1/2	0 3	0 6 10 1/2	
14 " 1/2 in. " "	0 4 1/2	0 3	0 8 9	
12 in. of 1/2 in. lead pipe for water closet pan	0 10	...	0 0 10	
3 in. of india-rubber tubing for ditto...	1 1	...	0 1 1	
1 in. self-closing ferrule cock for do...	7 4	...	0 7 4	
1 in. elbow ferrule, with union joint ...	1 6 1/2	...	0 1 6 1/2	
1 in. "	2 3 1/2	...	0 2 3 1/2	
1 in. socket piece	0 8	...	0 0 8	
2 in. elbow pieces	0 7 1/2	...	0 1 3	
3 in. socket pieces	0 6	...	0 1 6	
1 in. bib cock	3 4	0 6	0 3 10	
1 in. stop-cock	5 2	0 6	0 5 8	
1 in. stop-cock	3 6	0 6	0 4 0	
2 stop-cock covers	4 6	1 6	0 12 0	
				2 17 7 1/2
SEWERAGE.				
32 lineal feet of 6-in. earthenware pipe ...	0 5 1/2	Price varies according to depth.		
14 " 4-in. " "	0 4			
1 " 6-in. syphon	4 6		2 6 7	
1 " 6 to 6 in. junction pipe	1 6			
2 " 4 to 6 in. taper pipe	1 4			
1 " 6-in bend	1 6			
1 kitchen sink	4 6	5 0	0 9 6	
1 4-in. bell trap for ditto	1 6	...	0 1 6	
1 earthenware sink, basin, and syphon ...	6 0	3 6	0 9 6	
1 water closet pan and fan, old seat	8 6	8 6	0 17 0	
1 6-in. bell trap	2 6	6 0	0 8 6	
Waste-pipe to kitchen sink .....	...	...	0 6 0	
Ash pit filled up and repaved .....	...	...	0 5 0	
Sewerage .....	...	...	5 4 4	
Water .....	...	...	2 17 7 1/2	
Total .....	...	...	8 1 11 1/2	

COST OF PRIVATE OR HOUSE DRAINAGE WORKS.

ALNWICK.

The cost of house drainage works necessarily depends, in a great measure, upon the position of the premises drained with regard to the main sewer; the length of

drains required, the depth at which they are laid, and the character of the subsoil.

The following particulars are given as the average cost of house drainage works in the towns named:—

Houses of £40 rental, with one water-closet,	£	s.	d.
cost about	15	3	3
Houses of £15 rental, with one water-closet,			
cost about	7	11	1
Houses of £7 rental, with one water-closet,			
cost about	5	4	4

The length of drain to each house in Alnwick, taken on an average of 516 houses, is 25½ yards.

The following list of loans, sanctioned under the Public Health Act (1848) and the Local Government Act (1858), will show to some extent the progress that has been made in carrying out sanitary works in England during the last twelve years:—

	£	s.	d.
1850 15th June to 31st December	41,665	0	0
1851 1st January to 31st December	103,706	0	0
1852 " " "	246,470	0	0
1853 " " "	500,740	0	0
1854 " " "	599,893	0	0
1855 " " "	424,126	6	3
1856 " " "	522,703	16	5
1857 " " "	312,612	11	0
1858 " 1st September	204,261	13	0
	£2,956,178	6	8

Amount of loans sanctioned under the Local Government Act:—

	£	s.	d.
1858, 1st September to 12th August, 1859	260,905	13	0
1859, 12th August to 21st August, 1860	280,259	7	4
1860, 21st August to 1st August, 1861	356,192	0	0
1861, 1st August to 1st March, 1862	129,998	0	0
	1,027,355	0	4
	2,956,178	6	8
	1,027,355	0	4
	£3,983,533	7	0

This amount has been borrowed by 178 towns or districts.

Improvement in social and in sanitary matters has made rapid progress of late. Within the last half century land drainage and town sewerage have ripened into sciences. From rude beginnings, insignificant in extent, and often injurious in their effects, they have become of the first importance. The introduction of machinery to make land drain pipes and town sewerage pipes, gave a forward movement to civilisation. Land, by judicious draining and improved cultivation, is frequently doubled in value, and town sewerage, with other social regulations, frequently prolong human life from 5 to 50 per cent. as compared with previous rates in the same districts, and, within my own knowledge, house property throughout a whole town is reputed to have been increased 25 per cent. in value by such works. Agues and typhoid fevers are reduced or entirely banished. John Howard, by his labours, has shown to the world what could be done for gaols and for criminals; Edwin Chadwick for town sewerage, and Florence Nightingale for camps, barracks, and hospitals.

With respect to the beneficial effects of sanitary measures, Sir. G. C. Lewis, in moving the Army Estimates, said—"There have been a large number of improvements introduced for the purpose of bettering the moral and sanitary condition of the private soldier. In the first place, there has been a great improvement in barracks; and I am happy to say that these improvements in barracks have not been unattended with important results. I will read for the committee some statistical returns, which I believe to be authentic, and which will show a marked improvement as regards the rate of mortality in the army. The returns are taken for two periods for an average of six years—1830-36, and 1854-60, giving the number per thousand. The annual mortality of the household cavalry from 1830 to 1836 was at the rate of 14 per 1,000; in the latter period it was only 5 per 1,000. In other cavalry it was at the first period 15 per 1,000; in the latter only 6 per 1,000. Royal Artillery, 15 per 1,000 in the first period; in the latter only 7 per 1,000. Foot Guards, 21 per 1,000 in the former period; and only 9 in the latter. The Infantry of the Line 17 per 1,000 in the former period; and only 8 per 1,000 in the latter. The returns for the colonies, of all forces, for the same periods, showed that for the former—namely, from 1830 to 1836—the mortality at Gibraltar was 22 per 1,000; but in the latter period only 9. Malta

STATEMENT

SHOWING THE POPULATION, NUMBER OF HOUSES, LENGTH OF SEWERS, NUMBER OF MANHOLES, LAMPHOLES, AND GULLIES, AND THE TOTAL COST OF THE PUBLIC SEWERAGE WORKS IN THE SEVERAL TOWNS NAMED; TOGETHER WITH THE AMOUNT, AND RATE IN THE £ REQUIRED PER ANNUM TO REPAY THE PRINCIPAL AND INTEREST IN THIRTY YEARS.

Works Devised and Completed by Robert Rawlinson, Civil Engineer.

TOWN.	Population.	Number of Houses.	Total Length of Sewers.	Number of Manholes.	Number of Lampholes.	Number of Gullies.	TOTAL COST OF WORKS.			AMOUNT PER ANNUM TO REPAY PRINCIPAL AND INTEREST IN THIRTY YEARS.			
							Amount.	Per House.	Per Head.	Total.	Per House.	Per Head.	Rate in the £ per ann.
			Yards.				£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Alnwick ...	7,916	947	11,132	54	28	110	4,327 18 10	4 11 4	0 12 4	250 5 10	0 5 3	0 0 8½	0 0 5
Berwick ...	10,067	1,151	7,995	40	51	128	5,649 1 4	3 17 10	0 11 3	326 14 0	0 4 5½	0 0 7½	0 0 3½
Carlisle ...	26,310	4,113	24,079	131	99	366	23,310 6 7	5 13 4	0 17 8	1,348 2 3	0 6 6½	0 1 0½	0 0 6
Chorley ...	12,684	2,337	13,295	79	47	282	10,546 4 7	4 10 3	0 16 8	669 18 9	0 5 2½	0 0 11½	0 0 6
Lancaster ...	14,604	2,698	12,820	126	118	288	9,215 5 7	3 8 6	0 12 8	534 13 9	0 3 11½	0 0 8½	0 0 4½
Morpeth ...	4,096	580	7,171	22	—	82	2,720 0 9	4 13 9	0 13 3	157 6 2	0 5 3½	0 0 9	0 0 6
Ormskirk ...	5,548	942	6,839	28	—	72	2,982 8 7	3 3 4	0 10 9	172 9 8	0 3 7½	0 0 7½	0 0 4
Pennith ...	6,668	1,344	7,152	15	99	48	3,109 0 2	2 11 0	0 9 4	179 16 1	0 2 5½	0 0 6½	0 0 3
Tynemouth ...	29,170	4,478	17,871	122	151	559	12,404 18 5	2 15 4	0 8 6	717 8 5	0 3 2	0 0 6	0 0 5
Workop ...	7,920	1,567	12,429	81	48	136	5,871 19 7	3 14 11	0 16 9	339 12 0	0 4 4	0 0 11½	0 0 6
TOTALS ...	123,183	20,457	120,693	698	644	2,101	80,168 3 3	—	—	4,636 7 10	—	—	—
AVERAGES ...	—	—	—	—	—	—	—	3 18 4½	0 13 0	—	0 4 6½	0 0 9	0 0 5
										Nearly.	Nearly.	Nearly.	Nearly.

Average Length of Main Sewer per House = 5·9 yards.

N.B.—Population to Houses about six to one; Private Works, such as house drains, yard sinks, soil-pans, &c., cost about equal rates to the above; that is, it is found from experience that the cost of private works of drainage, and of Water Supply Fittings, is about equal to the cost of Public Works of Sewerage and Water Supply.

showed a diminution from 18 to 14 per 1,000; Ionian Islands, from 27 to 9 per 1,000; Bermuda, 35 to 11 per 1,000; Canada, 20 to 10 per 1,000; Jamaica, from 128 to 17; Ceylon, from 74 to 27. These are great results, and they are owing to the changes made in the sanitary condition of the army."

Since the year 1840 great and beneficial sanitary improvements have been effected in English towns. An annual mortality of 44 in the 1,000 has been reduced to 27, and 30 to 20, and even as low as 15. Human life has more value in England than in any other country in the world, entirely due to better sanitary arrangements.

PARTICULARS OF SEWERS AS EXECUTED IN THE CITY AND TOWNS NAMED.

	Depth to invert of sewer.	Thick-ness of Brick-work.	Number of bricks per lineal yard.	AVERAGE COST OF SEWERS PER LINEAL YARD.						
				Birming-ham.	Buxton (in Rock).	Carlisle.	Chorley.	Tyne-mouth.	West Ham.	Workop.
<i>Brick Sewers:—</i>	<i>Ft. in.</i>	<i>Ft. in.</i>		<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>	<i>£ s. d.</i>
4 ft. 6 in. by 3 ft. 0 in. ...	10 0	0 9	432	1 11 6	—	—	—	—	2 3 3	—
3 ft. 9 in. by 2 ft. 6 in. ...	10 0	0 9	384	1 8 0	—	1 3 6	1 14 2	—	1 18 1	—
3 ft. 0 in. by 2 ft. 0 in. ...	10 0	0 9	304	1 6 0	—	1 2 6	1 5 5	—	1 8 8	—
2 ft. 3 in. by 1 ft. 6 in. ...	10 0	0 9	248	0 19 0	—	0 18 6	1 4 8	1 5 6	1 3 9	0 19 9
1 ft. 6 in. diameter ...	10 0	0 9	208	0 18 0	—	0 16 0	0 17 6	—	—	—
3 ft. 9 in. by 2 ft. 6 in. ...	10 0	0 4½	172	0 17 0	—	—	—	—	—	—
3 ft. 0 in. by 2 ft. 0 in. ...	10 0	0 4½	136	0 16 0	—	0 17 6	—	—	0 19 8	—
2 ft. 3 in. by 1 ft. 6 in. ...	10 0	0 4½	112	0 12 0	—	0 15 0	0 11 10	0 18 6	0 17 6	0 13 8
1 ft. 6 in. diameter.....	10 0	0 4½	88	0 10 0	—	0 14 0	0 10 11	—	—	—
<i>Earthenware Pipe Sewers:—</i>										
15 inches diameter.....	10 0	—	—	0 9 4	0 11 3	0 9 6	0 9 10	0 9 2	0 11 10	0 5 9
12 inches do.	10 0	—	—	0 7 8	0 10 4	0 7 9	0 8 2	0 7 5	0 9 4	0 4 6
9 inches do.	10 0	—	—	0 6 5	0 9 0	0 5 9	0 5 4	0 5 7	0 7 3	0 3 9

QUESTIONS AND ANSWERS RELATIVE TO SEWERAGE WORKS IN THE TOWNS NAMED. MARCH, 1862.

QUESTIONS.	ALNWICK.	BERWICK-ON-TWEED.	BUXTON.	CARLISLE.	LANCASTER.	WORTHING.
What is the average annual expenditure incurred below the surface of the streets, in cleansing the sewers?	Nothing.	From £10 to £12.	Nothing has been expended.	None.	£4 in four years, or £1 per annum.	Nothing. Works executed in 1854.
The number of sewers choked per annum, if any, and the causes of stoppage?	About 20 house-drains per annum. Sand, dish-cloths, and sticks.	Four or five, from offals of animals, ashes, sand, gravel, &c.	None.	Not more than 2 or 3 per cent. in 9-inch pipe sewers, owing to flat gradients and backing up of floods. Direct stoppages are caused by improper substances being passed into the drains.	Average five at blank ends. Main sewers never stopped.	None.
Have you any complaints of sewage injuriously affecting fish in the river or stream into which it is passed?	No.	No.	No.	No. Any complaints on this head have been in consequence of an overflow from the sleeper dipping tanks of a railway company passing into the sewers. Waste creosote.	No.	The sewage does not go into a river or stream, but out to sea.
Average annual cost of flushing sewers, if any?	£2 per annum.	Flushed occasionally by the Surveyor or his assistant, but at no additional cost to the Board.	They have only been flushed once during the last year.	Water given by Water Company. Flushing and maintenance of sluices attended to by scavengers.	£5 (labour only).	About £13.
Do the sewers generally serve the purposes intended?	Yes, if properly used.	Yes.	The main sewers are all in good order and work well.	Yes.	Yes.	Yes.

It has been said, "as are the people so will be the government," but my experience leads me to the conclusion that bad government necessarily makes a bad people. Temptation is the parent of vice, and opportunity the broad road leading to destruction. A little leaven of evil leavens the whole mass. Lord Shaftesbury, through the entire of his most valuable life, has appreciated the facts stated, and has devoted himself to teaching, by example and by precept, to preventing as well as to reforming. His "Common Lodging Houses Act" has probably internal fires of destruction made the earth tremble

done more good than any other law of modern times, by removing temptation, and, therefore, preventing evil. Before the passing of this act there was no check to vice in its most disgusting forms. I only indicate that which I have seen, and cannot, consistently with the decencies of society, openly describe. I can only say that our civilisation resembled those volcanic regions where the beneath the feet of the dwellers on the treacherous surface—a sudden outbreak might at any time take place, and overwhelm all in ruin.

Social improvement must begin in the upper circles of

society, that it may descend in precept, and be enforced by example. Our own good Queen Victoria understands this. The great and wise Prince we have recently lost, and whom we so deeply mourn, fully understood this. The deep-thinking, far-seeing ruler, who sits on the Imperial throne of France, appreciates the fact. In the International Exhibition of 1851 the model cottages of Prince Albert probably worked more human good, by encouraging home improvements, than all the glitter of precious stones, the wealth of jewellery, and the subtle refinements of art. The poor are utterly powerless to help themselves in matters of sanitary improvement. They cannot build their own houses, but must inhabit such as are provided by others. They cannot make the laws, neither can they administer such laws as are made. If the laws are wise they receive the benefits, if otherwise, they suffer. Social science, as it is termed, must be administered by the State, and this Lord Brougham fully understands. It will be an evil day for society when Government divests itself of all executive power in social and sanitary matters. Freedom is a glorious thing, but license, to initiate and work evil against the general body of society for private gain, is neither a safe nor a desirable state of freedom. A state which can tolerate cesspools, beerhouses, gin palaces, and can license dancing saloons, must bear with vice, crime, lunacy, and pauperism in excess.

Wise Imperial laws are required, and honest and intellectual administration nationally and locally to secure sanitary progress, and the greatest amount of political contentment, commercial prosperity, health and social comfort to a nation.

DISCUSSION.

Dr. STENHOUSE, F.R.S., had listened with great pleasure to Mr. Rawlinson's able paper, but would not presume to offer an opinion upon the engineering part of the subject. There was one question, however, in which he had taken great interest, that was as to the use of charcoal air-filters for ventilating sewers. It was towards the close of the year 1853 that he first directed attention to the subject of charcoal in connection with the ventilation of impure atmospheres, and at that time he found that the opinions then prevalent with regard to the properties of that agent were in many respects very erroneous. Charcoal was generally represented to be an antiseptic, whereas he found the contrary was the case—that instead of preventing decomposition it was an agent in promoting it, from its capability of absorbing large quantities of gases. He also found that the charcoal would operate for almost any length of time, because it was not acted upon by the gases with which it came into contact. The properties of charcoal when employed for these purposes were first illustrated by its employment in the form of respirators, for when a charcoal respirator was placed over the mouth it was found that a person could breathe noxious gases for some time without injury. The atmospheric air passed through the charcoal, but the poisonous gases were retained and gradually oxidised. Dr. Stenhouse exhibited an apparatus composed of charcoal fixed between perforated zinc plates, which he had employed in the ventilation of public courts and rooms, and which he said had been used with excellent effect in the courts of the Guildhall and Mansion-house, as well as elsewhere. The apparatus had been in operation seven years in the justice room at the Mansion-house, and during that period the charcoal had been changed only once. A few years afterwards that plan, with some modifications, was adopted by Mr. Rawlinson. Dr. Letheby, and Mr. Haywood for the ventilation of sewers. He was happy to say the subject was beginning to attract general attention, and he believed in the course of a few years charcoal ventilation would become almost universal.

Mr. RAWLINSON called attention to one of the charcoal boxes of the description used by him in the sewers at West Ham. Since the first application of the system he had

thought it expedient to have the charcoal broken into smaller pieces than he had first employed, and when this was done its action was much more effectual.

The Earl of ESSEX said he was amongst the earliest of those who had attempted to utilise the sewage of towns for agricultural purposes, as distinguished from the ammoniacal liquids derived from the farm premises, which, being much stronger than town sewage, and containing a much larger quantity of fertilising agents, were applied to the land in smaller quantities. He was one of the first to try the effects of actual sewage on land, and he suffered the usual fate of pioneers of improvements by having gone to a much greater outlay than was necessary, from which it resulted that the profits upon the experiment were much less than they would otherwise have been. In the outset he made a great mistake in supposing that the sewage of a town (Watford), with 4,000 inhabitants, would be sufficient to irrigate upwards of 230 acres of land, over which he laid pipes, for he had since found that the whole sewage of that town would not be sufficient for more than sixty or seventy acres, consequently the benefits of the system were lost upon 150 acres over which the pipes had been laid; and at the present time the larger portion of the pipes were lying useless from the sewage supply being insufficient for so extensive an area. In other respects also he made mistakes which were very common in such matters. His steam power was less than it ought to have been, and the main pipes he laid down were too small. He believed if the system had been carried out with more practical judgment it would have paid very well. At present it paid tolerably well, inasmuch as with all the unnecessary outlay he had incurred he could put the sewage upon the land at a cost of five farthings per ton. His belief was that if the outlay had been regulated by the amount of land which the sewage supply at his command was capable of irrigating, he should have done it at a cost, at the outside, of three farthings per ton, which would have given him most satisfactory results, and he was sure any agriculturist who could obtain the sewage at that rate, would never regret the outlay. He had employed this method of irrigation for meadow land immensely to his satisfaction, and by far the greatest results had been produced upon Italian rye grass. He could state that during one summer, upon seven acres of Italian rye grass, he fed thirteen bullocks, seven horses, several ponies, and a large number of pigs. Five of the bullocks were sold in a fat condition in July. During a temporary stoppage of some of the works he fed the bullocks upon cake, but these did not pay better than those which had been fed upon the rye grass alone. He had tried sewage irrigation to crops of mangold-wurzel with great success, and from seven acres which had been transplanted, owing to the plants being very irregular, he obtained a crop of 47 tons per acre. He would add that he had tried the system upon a smaller scale upon wheat crops, relative to which the opinion prevailed that the application of this description of manure increased the quantity of straw without adding to the bulk of the grain. He tried the comparative results of irrigation and non-irrigation on four acres of wheat. Two acres were irrigated to the extent of 60,000 gallons of sewage, and two more were allowed to remain without irrigation; and the relative produce per acre was as follows:—On the irrigated land, 5 loads of straw at 30s. per load, £7 10s.; and 53 bushels of wheat at 6s. per bushel, £15 18s., making a total return of £23 8s. On the non-irrigated land the total return per acre was £20 6s. 6d., leaving a surplus in favour of the irrigated land of £3 1s. 6d. Allowing for the cost of irrigation at the extreme price of five farthings per ton, the quantity put upon an acre cost 14s., and deducting that from the £3 1s. 6d., there was a clear balance of £2 7s. 6d. in favour of the irrigated land. He believed the system judiciously applied would be found to be extremely beneficial.

Mr. CAMPBELL (of Rugby) would offer a few observations relative to the subject introduced by the noble earl who

had just sat down. He (Mr. Campbell) had employed the sewage of Rugby on his land for the last six years. He had been a sufferer from the causes mentioned by the noble earl, although not to the same extent. In the first application of the sewage he did not understand the proper way of using it. He contracted with the lessee of the sewage for £1 per acre for 150 acres, for which five dressings of the town sewage were to be put on that land, which at the first seemed to be a very good bargain, but the question afterwards arose as to what quantity should be considered a dressing. After some discussion between himself and the lessee the point was referred to the chairman (Mr. Mechi), who decided upon 9,000 gallons per acre, whilst he (Mr. Campbell) contended for a much larger amount, but that point was given against him. Then there was the consideration as to the constituents of the sewage, and upon that point he came to the conclusion that the application of 9,000 gallons, or even the 45,000 gallons for the five dressings per acre of sewage so largely diluted with water, produced very little fertilising effect. He was well acquainted with the irrigation of the Edinburgh meadows. The quantity applied was very large—he believed as much as 8,000 tons per acre.

Mr. EDWIN CHADWICK.—Sixty inches per acre.

The CHAIRMAN remarked that that would be equal to 6,000 tons.

Mr. CAMPBELL had taken his facts from the blue book, but there was a difference between the Scotch and English acre. Some present might not be aware of the enormous rents which were paid for that irrigated land in Edinburgh. When on a visit there last summer he was informed by the proprietor that one cow-keeper paid him as much as £40 per acre for six acres of that land. His (Mr. Campbell's) experience at Rugby had led him to abandon the application of the system to ploughed land, except in very dry seasons to some particular green crop. He had no doubt, if he were to apply the whole £150 worth of sewage to 8 or 10 acres of meadow land, he should obtain large crops of grass equal to those at Edinburgh; but it became a question at what amount of expense they could obtain those large results, because they might "buy gold too dear." The sewage of Rugby was, in the first instance, imagined to be so extremely valuable that the Board of Health thought fit to charge a rental of £50 for it. He thought that was a wrong thing to do. They ought to have been content with conveying the sewage to a large tank, half a mile from the town, and allowing it to be applied to the land without any charge to the agriculturist. A prevalent error in these cases was the laying the pipes over a greater extent of land than could be profitably irrigated with the present quantity and quality of sewage. In the case of Rugby, he did not believe they got the whole of the sewage, inasmuch as from the small dimensions of the main pipes, he thought a great portion went back to the tank again. He was induced to think that the sewage of Rugby, from a population of about 7,000, would not be sufficient for more than from 40 to 50 acres of land.

The CHAIRMAN inquired what was the highest price Mr. Campbell got for his Italian rye grass.

Mr. CAMPBELL replied that it was not saleable, as people did not appreciate its value. For his own part he cultivated it from a wish to have as large a supply of green fodder for his cattle over as long a period of the year as possible.

The CHAIRMAN inquired what was the amount of the grass crop on Mr. Campbell's land.

Mr. CAMPBELL replied from 30 to 40 tons per acre had been obtained in some cases, but this was not equal to Edinburgh. Until last year the application of the sewage had been principally by the hose, but he believed better results were obtained on Italian rye grass by the distribution of liquid from the cow houses by carts, with the addition of the stronger ammoniacal liquor from the gas works, than from the town sewage with hose and pipe.

Mr. BLACKBURN said, from what had fallen from the

last speaker, it might be supposed that the enormous amount of sewage used at Edinburgh was necessary to produce the results there obtained, but instead of 6,000 tons, (the quantity there used on the shedding and open gutter system,) the land which had last year realised the largest rent, viz., £40 an acre, received only 2,000 tons, and that distributed by gutta percha hose. It might be inferred from this that the smaller quantity applied by hose under proper conditions, raised as much grass as the larger quantity applied on the shedding system. It might also be seen that a great waste was the result of the larger application, and that the sewage, after having passed over the land, had not parted with all its fertilising properties, from the fact of the soil not having been able to filter so large a quantity. He had seen the application at Rugby alluded to by Mr. Campbell, and which had certainly been carried out in a very imperfect manner. The tank, pump, and pipes were all badly arranged, and out of proportion, thereby involving heavy working expenses; the sewage had been applied to land unfitted for its reception; the ridge and furrow surface was not suited to receive the sewage from the hose, and instead of a uniform absorption by the soil all over its surface, that which was delivered on the ridge very quickly found its way into the furrow, and so produced a most unequal growth. They had entirely overlooked the importance of selecting proper grasses, and had taken the land for the purpose planted with the common natural grasses, which, although well-suited to its original condition, were not at all fitted to realise the best results under the very altered circumstances in which the soil was now placed. In corroboration of this, he might state that on a portion of the meadows near Edinburgh, a plot which, when growing the natural grasses, was let at a yearly rent of £13, was broken up, relaid, and sown with a variety of grass suited to irrigation, and the first season realised a rent of £27, all conditions remaining the same except the variety of the grass grown. This was an important fact, which in most cases had been overlooked.

Mr. HAYWOOD (Engineer to the City Commissioners of Sewers) remarked that the paper dealt with many topics which could only be properly treated before a professional audience, but as there were, no doubt, many unprofessional gentlemen present he would, in the first place, ask Mr. Rawlinson what was the meaning of the somewhat startling diagram which he saw before him [alluding to the drawing representing a form of sewer which was nearly blocked up with filth]? He could hardly suppose it was intended to represent a sewer; and he would ask Mr. Rawlinson whether he had ever seen a sewer in that condition?

Mr. RAWLINSON said the drawing was copied from a published diagram, and he would rather have left out the representation of the accumulated deposit. He only referred to it as showing a form of sewer in which large accumulations of solid matter were liable to take place. He had himself seen sewers in as bad a condition as was shown in the drawing alluded to.

Mr. HAYWOOD wished it had never been produced, because he believed nobody but Mr. Rawlinson ever saw a sewer in the condition there represented.

Mr. RAWLINSON remarked that Mr. Haywood managed the district under his charge so well that he could not imagine such a state of things could exist out of it.

Mr. HAYWOOD would call attention to the difficulty in which the modern system of the sewerage of towns had placed them, which was, that almost every rivulet in the country was more or less polluted, and they did not know how to obviate that difficulty, inasmuch as the agricultural community had not yet found proper means of utilising the sewage matters. If they did not, however, the whole of the large towns of England would be in a very serious condition, for this reason—that they were compelled to drain into the rivers, which were thus polluted to a most dangerous extent.

The CHAIRMAN believed that was the case at Birmingham.

Mr. HAYWOOD—Not only was it the case in Birmingham, but in many other parts of the country. With the large population of Birmingham that would be one of the principal instances of the difficulty to which he alluded. But there were smaller towns which were in a similarly unfortunate condition. He might mention the fact that at the present time the town of Croydon was under an injunction to restrain it from discharging the drainage of a population of 18,000 into the river Wandle. The local authorities there had hired 300 acres of land, on which to distribute the sewage of the town; but even that large area was found to be wholly inadequate to prevent the pollution of the river to such an extent as to lead to the issuing of an injunction. Therefore, he said, the modern system of sewerage had placed them in a tremendous difficulty, which would not be met by allowing the agriculturists to take just as much of the sewage as they were in a position to dispose of upon the land, but it would rest upon the Local Board of Health to provide a sufficient acreage over which to distribute the sewage matters; and what would be the area required for a town like Birmingham, with its 400,000 inhabitants, when they found that, in the case of Croydon, 300 acres were not sufficient for a population of only 18,000? It was one of those difficulties which, if not met, he believed in the course of years would compel them to go back to the old system of cesspools. There was one other subject to which he would allude—that was the application of charcoal, as an agent for the ventilation of sewers. He believed the priority of that application was due to Mr. Rawlinson, and he had great pleasure in stating that fact. In the reports of Dr. Letheby and himself, as to the application of charcoal, he was sure that no fact had been concealed, but there was at present great difficulty in ascertaining the results of that experiment. The prevention of the escape of effluvia into the atmosphere above the sewers was a well-known result, and the deodorising properties of charcoal were also well known; but the question to be considered was, what would be the ultimate effects within the sewers? Would it or would it not intercept the necessary action of the atmosphere? Would it or would it not, in the long run, render the atmosphere of the sewers so deadly that men on entering them would be struck down suddenly, as had been the case in a recent instance? On that subject he was unable to give an opinion, but these questions had occurred to his mind. His present impression was that the plan could be beneficially applied as regarded preventing the escape of effluvia from the sewers, but whether or not it would result in rendering the sewers more deadly internally he was not at present able to say.

Mr. Alderman TOWLE (of Oxford) expressed his opinion generally that in the present largely diluted condition of the sewage of towns, its application to the land would produce very little result. There would be no question as to the fertilising properties of house sewage if it could be obtained without so large an admixture of the water which conveyed it away.

Mr. W. M. HAWES thought, owing to the presence of the gentleman who occupied the chair that evening, the discussion had rather been confined to the agricultural view of the question, than to the more practical view in which they, as inhabitants of the largest city in the world, were interested. If there was one point of view in which the perfect sewerage of a town was interesting to them, it was as it affected the improvement of the health and comfort of the great masses of the working population who had no choice as to residence—who were obliged to take such ill-drained and ill-ventilated dwellings as they could find, and who were compelled to suffer all the diseases which were incidental to those circumstances. As regarded the improved health of the working classes of the metropolis, he believed good systems of drainage were a most important element. In the first place they not only saved the cost always attaching to illness—they not only spared the anxiety which was involved in sickness in

a working-man's family—but they increased the muscular powers of the labouring population of the country, inasmuch as every working man was efficient in proportion to the amount of health he enjoyed. But there was another point in which they were, perhaps, even more directly interested, viz., the increased value of property in all cases where drainage had been attended to. There was one town in particular (Worthing) mentioned in the paper, of which he could speak from his own personal knowledge. It was a watering-place, on the southern coast of England, which, a few years back, was hardly habitable for the want of drainage. Almost everybody who went there in the summer season left it again on account of the nuisance created by the natural drainage from the town passing through the shingle of the beach, mixing with seaweeds, fermenting and putrifying, and rendering the place almost uninhabitable. That town had been drained under the management of Mr. Rawlinson, and he (Mr. Hawes) could state that during the four or five years the drainage had been in existence the value of property there had very materially increased, far beyond the amount which the inhabitants had to pay in the shape of extra rates for the drainage, and the water supply which was connected with it. Knowing so well as he did the effects which had resulted from these improvements, he could say that there was not only an increase of health even in the worst parts of the town, but an increase in the prosperity of the inhabitants arising from the larger number of visitors who went there. Having regard to drainage as a means of improving the health of the great masses of the people, and improving also the value of property, the next question was to find the means for utilising the sewage. He did not undervalue the importance of ventilating this subject, as it would contribute to the store of information; but when he heard gentlemen talk about the necessity of going back to cesspools, he was surprised that any engineer of the present day, whatever might be the difficulties to be overcome, should for a moment think of reverting to the oldest, worst, and most abominable system ever resorted to. He should have expected to have heard from one in his position some such sentiment as this:—"Whatever may be the difficulties, they must be overcome, let the cost be what it may."

Mr. SMITH wished to ask Mr. Rawlinson whether he had considered the effects that would be produced upon the Thames under the system of arterial drainage which was now being carried out in the metropolis.

Mr. Rawlinson said he held in his hand the report of Messrs. Bidder, Hawksley, and Bazalgette, but he had purposely avoided touching upon the question of the main sewerage of London. He had confined his paper entirely to illustrations of his own practice, and he had given the details of his own experience only, and therefore he must decline entering into the question as it affected London.

Mr. SMITH went on to remark that the sewerage of large towns had been a subject of study with him for the last eight or nine years, and he had been connected with extensive drainage operations in the city of Dublin in connection with the utilisation of the sewage for agricultural purposes. A great deal had been said as to the inefficacy of sewage as applied to agriculture. His own opinion was that in many cases this arose from the want of effective drainage, but if there were perfect drainage and filtration through the soil, he felt convinced that benefit must arise from the distribution of the sewage upon the land. With regard to the sewage of London, he was convinced that the plan now being carried out would be ineffectual to promote the end in view. He did not care how far down the river they carried the sewage, the tidal influence would bring it back again. There were two mechanical forces acting in opposition to each other, and wherever these were balanced the sewage would be precipitated, causing those accumulations which, under the action of the sun, were so detrimental to all large

cities. He agreed with Mr. Haywood, that the time would soon come when, if the present system of sewerage was carried on to the extent it had been of late years, some legislative enactment must be introduced with regard to the distribution of the sewage over the surface of the earth as a fertiliser of the soil.

The CHAIRMAN said the time having arrived for bringing the meeting to a close, he would only say a few words. In the first place he must compliment Mr. Rawlinson upon the very able paper he had given them, which if placed in the hands of people in various parts of the country would give them information of great value. As far as he was concerned he would express generally his sense of the extreme value of perfect drainage and ventilation in all towns and cities; but he looked at the question rather in its agricultural bearings; while on the one hand they took care of the health of the people, they must on the other hand provide for their being cheaply and well fed, and he must say he hoped the time would come, as he had no doubt it would—when these valuable matters would be employed to a large extent in fertilising the land, which was exhausted by the products taken from it. He did not think people were generally aware how much land was annually exhausted for the purpose of providing food for the metropolis alone—the people and animals kept within it. He would state, as the result of a calculation carefully made, and which he believed came very nearly to the actual fact, that it required the produce of upwards of six millions of acres to feed the population of London and the animals employed in it. Taking that to be the fact, let them imagine where all that food was to go to after it had been consumed. Were they to think of putting it on 10,000 or 20,000 acres of land? Were they to rob the great extent of land required for the support of London alone of its natural fertiliser, and concentrate an enormous nuisance over a limited area? It was contrary to all reason; and he was sure the time would come when they must seriously entertain the question of spreading that valuable matter over a very large surface of the country to compensate the soil for the large annual demands that were made upon it. He had great faith in the agricultural intelligence and enterprise of the country; and though this was considered an impossible and unprofitable operation now, it would not be so fifty years hence. He had no doubt there would be great changes in that time; but to suppose they were to put on 6,000 tons an acre to create an enormous nuisance, as a general rule, was contrary to common sense. They had the authority of some of the most eminent chemists of the day, that the value of London sewage was 2d. per ton, taking it as compared with guano, and if it were applied within 40 or 50 miles of London, this could be done for a penny per ton. This country ought, with the means at its command, to be one of the richest agricultural countries, for its size, in the world. Last year they paid no less than £75,000,000 sterling for articles consumed by the population and animals in this country. That was an enormous sum, and the farmers of this country would know how to appreciate the value of that amount, if thrown back upon the land in the shape of fertilising agents; and the wasting of it must be regarded as a great national loss. He begged to move a vote of thanks to Mr. Rawlinson for his valuable paper.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 26th inst., a paper by Mr. Henry Ashworth, "On the Commerce of our Colonies and their Cost," would be read. On this evening the Right Hon. C. B. Adderley, M.P., will preside.

Home Correspondence.

THE MAURITIUS.

SIR,—I was not present on the evening of Wednesday, the 12th inst., when Mr. Morris read his paper on "Mauritius," or I should have demurred at the time to the correctness of the opinion which he expressed, that the present scale of duties on sugar constitutes a monopoly in favour of the English refiner, and as such a protectionist tariff.

As a sugar refiner, I ask the favour of the insertion of a few observations.

Monopoly must be a term quite inapplicable to a system which allows competition; and it will, I think, be evident, to those who consider the matter in all its bearings, that no protection is given to the home refiners, who, it should be stated, buy their sugars duty paid; and, in addition to the inferior sugars which they use, purchase largely of the descriptions which pay the higher rates of duty.

In the process of refining, the first step is to remove the impurities which exist in nearly all sugars as imported; afterwards, the crystallizable sugar is separated from that which is uncrystallizable, or molasses.

The existing scale of duties is calculated upon the theory that the lower qualities contain a larger proportion of molasses in combination with the sugar, and they are, therefore, admitted at a duty of 12s. 8d. per cwt.

Molasses being admitted at a duty of 5s. per cwt., the planters can, if they think it worth while, separate more of the molasses, or the whole of it; and the sugar will then have to pay, on arrival here, 13s. 10d., 16s., or 18s. 4d., per cwt.

If the assimilation of duties to one uniform rate be ever enacted, justice will require that the home refiners be either permitted to refine in bond—a course objectionable on revenue considerations, both to the Government and the trade—or that they be allowed, on exporting the molasses which they extract from the sugar, a drawback of the same rate of duty which may have been previously paid upon it, viz., that levied upon sugar; also on the molasses sold for home consumption, a difference between the duty on molasses and that of sugar.

Inconsistency in the decisions of Customs officers may be prevented by appointing to the post of assessors those only who have acquired a thorough knowledge of the various qualities of sugar, and retaining them in that position by an adequate remuneration, instead of making frequent changes.

I am, &c.,

THOMAS HICKS.

11, Little Alie-street, E., 18th March, 1862.

BUILDINGS FOR INSTITUTIONS.

SIR,—There are many questions respecting the successful working of Educational Institutions for the people which have yet to be solved, and of these, perhaps, one of the most important is that which concerns the buildings where the operations of these Societies should be carried on.

Anyone having extensive acquaintance with the various aspects of Mechanics' and kindred Institutes, will not fail to notice the absence of general principles on which the buildings are arranged, the result being that in many cases a large outlay has only produced an inconvenient set of rooms, which might have been put up at half the cost, and have been far more useful, if planned with care. This large expenditure for building purposes often saddles a society with a heavy mortgage, which cripples the working of the institution, the screw being generally applied the more tightly to those very parts where the greatest amount of good should be effected.

It is true the Yorkshire and other Unions of Institutions have published plans of buildings which would, no doubt, be very suitable in many cases, but I do not recollect to have seen any general plan enunciated, by which the number of rooms, their size, &c., should be

regulated, according to the population to be accommodated in any place.

During the summer we are promised a great gathering of the members, managers, and friends of all the principal Institutes in the country; and it might perhaps be possible for the Society of Arts, which has already done so much to raise the character of our educational institutions, to arrange a sort of conference on that occasion, with the special view of deducing certain broad principles on which substantial, commodious, yet economical buildings may be erected.

Two classes of buildings would, it appears, have to be considered,—those for rural districts, with a scattered population and but few houses in any particular spot, and those for towns having concentrated resources. The first would probably be resolved into a small reading room and library, fitted up at some roomy cottage, in the most central part of a parish, with little branch establishments in the remote parts, where the books from the library might circulate in parcels among those willing to read them. The village schoolroom would be the lecture-hall. In the second case, however, the conditions are so various that some difficulty would be experienced in arriving at anything like a universally applicable standard. Perhaps the calculations could be made from a unit of say 3,000 inhabitants. Once deduce the exact accommodation which an Institute for the population ought to require, and then calculations could easily be made for any larger place, according to the principles laid down in the first process. Twice the population would need rooms one-half as large again, and so on.

I venture to think that very much good may result from the discussion of this subject, and, with your permission, I will endeavour to point out, in a future communication, some of those general principles to which I have called attention.

I am, &c.,

JOHN JONES,

Organising Agent to the South Staffordshire Educational Union.

Dudley, March 12, 1862.

MEETINGS FOR THE ENSUING WEEK.

- MON.....R. Geographical, 8½. 1. Dr. A. Barton, "On the Exploring Expedition to the Western Borders of China, and the Upper Waters of the Yang-tse-kiang." 2. Lieut. Oliver, R.A., "Notes on the Country to the West of Canton." Actuaries, 7.
Medical, 8½. Dr. Anstie, "On the Treatment of Epilepsy."
TUES....Medical and Chirurgical, 8½.
Civil Engineers, 8. Mr. James Abernethy, "Description of Works at the Ports of Swansea, Silltho and Blyth." Part II.
Zoological, 9.
Educational Museum, South Kensington, 8. Mr. E. A. Freeman, M.A., "On the Difference between Minster and Parish Churches."
Royal Inst., 3. Mr. John Marshall, "On the Physiology of the Senses."
WED....Society of Arts, 8. Mr. Henry Ashworth, "On the Commerce of our Colonies and their Cost."
Royal Soc. of Literature, 4½.
Archæological, 8½.
THURS....Royal, 8½.
Antiquaries, 8½.
Philological, 8.
Philosophical Club, 6.
Royal Inst., 3. Professor Tyndall, "On Heat."
FRI.....Royal Inst., 8. Admiral Fitzroy, "An Explanation of the Meteorological Electric Telegraphy, and its basis now under trial at the Board of Trade."
Royal United Service Inst., 3. Dr. Parkes, F.R.S., "The Causes of Sickness amongst British Soldiers during Campaigns, and the best means of preventing this sickness."
SAT.....Royal Inst., 3. Professor H. E. Roscoe, "On Spectrum Analysis."

To Correspondents.

ERRATUM.—In the last number of the *Journal*, page 273, col. 1, line 4, for "years" read "centuries."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par.
Numb.

30. Railway and Canal Bills (1. Abbey Holme, Leegate, and Bolton Railway; 2. Aberystwith and Welch Coast Railway; 3. Abingdon Railway; 4. Andover and Great Western; Andover and Redbridge; Andover, Redbridge, and Southampton Railways; 5. Banstead and Epsom Downs; 6. Barnsley Coal Railway Extension; Berwickshire Railway; 7. Bishops Waltham, Botley, and Bursledon Railway (No. 1); 8. Bradford, Wakefield, and Leeds (Deviation), Bradford, Wakefield, and Leeds (Further Provisions) Railway; 9. Bridge of Weir Railway; 10. Bristol and Clifton, Bristol and South Wales Union Railways; Bristol Port Railway and Pier; 11. Briton Ferry Dock and Railway; Burton upon Trent Railway; 12. Caledonian Railway (Deviations, &c.); Caledonian Railway (Leith Branches); 13. Cannock Chase Railway Extension; 14. Carlisle and Silloth Bay Railway and Dock; 15. Cleveland Railway; 16. Cromford and High Peak Railway)—Board of Trade Reports.

Delivered on 27th February, 1862.

14. Works and Public Buildings—Abstract Accounts.
30. Railway and Canal Bills (17. Dartmouth and Torbay Railway, Daventry Railway; 18. Deeside Railway; 19. Denbigh, Ruthin, and Corwen Railway, Dovey Reclamation; 20. Dundee and Perth and Aberdeen Railway Junction, and Dundee and Newtyle Railway; 21. Eastern Counties Railway (Colchester Branch); 22. Eastern Union Railway; 23. East Grinstead, Groombridge, and Tunbridge Wells Railway; 24. Eden Valley Railway; 25. Edgware, Highgate, and London Railway; 26. Faringdon Railway; 27. Fosterly and Stanhope Railway; 28. Furness and Coniston Railway Companies, Furness Railway; 29. Garston and Liverpool Railway, Great Northern Railway (Nos. 1 and 2); 30. Great Southern, and Western, and Limerick, and Castleconnell Railways, &c.; 31. Great Western, and Andover, and Redbridge Railway Companies, Great Western Railway (Additional Powers)—Board of Trade Reports.
19. Bills—County Courts Procedure.
20. "Births and Deaths Registration (Ireland).
21. "Bleachfields (Women and Children Employment).
24. "Prosecutions Expenses.
North "America—Papers (No. 8) relating to the Blockade of the Ports of the Confederate States.

Delivered on 28th February, 1862.

11. Metropolitan Board of Works—Report.
52. Tenure and Improvement of Land (Ireland)—Returns
60. Russian Dutch Loan—Account.
62. London Bridge—Return.
65. Sardinian Loan—Account.
66. Greek Loan—Account.
68. Navy ("The Warrior")—Return.
61. Local Acts (1. Rogerstown Embankment and Reclamation)—Admiralty Report.
30. Railway and Canal Bills; (32. Great Western, Hereford, Ross and Gloucester, and Ely Valley Railway; 33. Hereford, Hay, and Brecon Railway; 34. Inverness and Aberdeen Junction, and Inverness and Ross-shire Railway; 35. Keighley and Worth Valley Railway; 36. Lancashire and Yorkshire Railway (Additional Powers), Lancashire and Yorkshire Railway (Doncaster, Goole, and Hull Junction Lines); 37. Leadburn, Linton, and Dolphinton Railway; 38. Leeds, Bradford, and Halifax Junction Railway; 39. London and Blackwall Railway; 40. London and North Western Railway (Additional Powers); 41. London and South Western Railway (Additional Powers); 42. London, Brighton, and South Coast Railway (Enlargement of Stations, &c.); 43. London, Chatham, and Dover Railway and Mid Kent Railway (Bromley to Saint Mary's Cray), London, Chatham, and Dover Railway (Extensions to Walmer and Deal), (Junction to Battersea, &c.); 44. Londonderry and Coleraine Railway, Londonderry and Enniskillen Railway; 45. London Railway Dept. and Storehouses, London, Tilbury, and Southend Railway; 46. Maryport and Carlisle Railway; 47. Metropolitan and Thames Valley Railway, Metropolitan Railway; 48. Mid Kent Railway; 49. Mid Kent and Addiscombe Railway; 50. Midland Railway (Rowsley and Buxton Extension); 51. Mid Wales Railway (Deviations, &c.); 52. Much Wenlock and Severn Junction Railway; 53. Newry and Armagh Railway; 54. Newton and Machynlleth Railway; 55. Oldham, Ashton-under-Lyne, and Guide Bridge Junction Railway)—Board of Trade Reports.

Delivered on 1st and 3rd March, 1862.

23. Factories—Return.
69. Railway and Canal Bills—Second Report from Committee.
64. Court of Chancery (Ireland)—Return.
70. Committee of Selection—Third Report.
22. Bills—Merchandise Marks.
23. "Register of Voters.
25. "Officers' Commissions.
26. "Copyright (Works of Art).
27. "Exchequer Bills (amended).

30. Railway and Canal Bills (56. Radstock and Kensham Railway; 57. Redditch Railway (Capital, &c.); 58. Rickmansworth, Amersham, and Chesham Railway; 59. Shrewsbury and Hereford Railway, Shrewsbury and Welchpool Railway; 60. Somerset Central, and Dorset Central Railway; 61. South Eastern Railway (Tunbridge and Dartford Lines, &c.); 62. South Yorkshire Railway and River Dun Company (Transfer, &c.); 63. South Yorkshire Railway (Hull Extension) and Sheffield and Thorne; 64. Tewkesbury and Malvern Railway; 65. Trent, Ancholme, and Grimsby Railway; 66. Ulster and Banbridge, Lisburn and Belfast Railway, Uxbridge and Rickmansworth Railway; 67. Vale of Clywd Railway; 68. Vale of Neath and Swansea, and Neath Railway; 69. Wycombe Railway)—Board of Trade Reports.
- North America—Paper (No. 9), Copy of Despatch from Lord Lyons respecting the Obstruction of the Southern Harbours.

Delivered on 4th March, 1862.

63. National Debt (Savings Banks, &c.)—Account.
71. Queen Anne's Bounty—Account.
72. West India Islands, &c., Relief—Account.
73. Colonial Military Expenditure, and other Colonial Statistics—Returns.
20. Customs and Inland Revenue—Return.
28. Chancery Regulation.
30. Railway and Canal Bills (70. Brecon and Merthyr Tydfil Junction Railway; 71. Bristol and South Western Junction Railway; 72. Crystal Palace and South London Junction Railway; 73. Dare Valley Railway; 74. Drayton Junction Railway; 75. Dulais Valley Mineral Railway; 76. Eastern Counties Railway and other Companies Amalgamation; 77. Eastern Counties Railway (New Lines in Middlesex); 78. East Gloucestershire Railway; 79. Enniskillen and Bundoran Railway; 80. Great North of Scotland Railway)—Board of Trade Reports.

SESSION 1861.

491. Poor Rate, &c.—Return.
Dated 1th March, 1862.
75. Metropolitan Improvements—Statement of Advances.
78. Sugar and Molasses—Return.
79. Malt Bonded, etc.—Return.
77. Foreign Wine—Account.
84. Hyde Park;—Estimate for a Temporary Road.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, March 14th, 1862.]

Dated 10th January, 1862.

72. R. Johnson, Liverpool—An improved composition for coating the bottoms of iron ships to prevent their fouling, and which composition may be used as a protective coating for wood, iron, or other substances exposed to the action of sea-water.

Dated 11th January, 1862.

123. J. C. Dickey, Saratoga Springs, New York—An improved quartz crusher.

Dated 28th January, 1862.

227. W. Irlam, Newton Heath, near Manchester—Imp. in the construction of railway crossings and turntables.

Dated 29th January, 1862.

237. R. A. Brooman, 166, Fleet-street—Imp. in machinery for puddling metals. (A com.)

Dated 30th January, 1862.

251. A. C. B. Malois, Paris—Imp. in the manufacture of boot and shoe heels, and in machinery to be used therein.

Dated 11th February, 1862.

350. W. H. Weaver, Edington, Bridgenorth, and C. Gall, Bridgenorth—Imp. in machinery for cultivating, ploughing, harrowing, or scarifying the land.

351. T. Fyle, 46, Leicester-square—Imp. in knapsacks and in apparatus for supporting them or other similar burdens upon the shoulders.

359. R. Johnson, Manchester—Imp. in welded wires used for telegraphic and other purposes.

Dated 13th February, 1862.

375. W. E. Newton, 66, Chancery-lane—Imp. in projectiles. (A com.)

377. J. Peters, Ulverston—Imp. in portable steam engines applicable to locomotive, stationary, and marine engines.

379. W. Williams, Bath—Imp. in pianofortes.

381. A. C. Ebbutt, 25, Blackman-street, Borough—Imp. in reclining, easy, and other chairs.

385. F. Falconer, Glasgow—Imp. in glasses for lamps.

Dated 15th February, 1862.

405. W. Avery, Birmingham—Imp. in machinery for the manufacture of screws, a part or parts of which improvements may also be used in the manufacture of pins, rivets, and nails.

Dated 17th February, 1862.

423. E. T. Hughes, 123, Chancery-lane—An improved method of, and apparatus for, collecting the gases given off from furnaces.

424. T. Birdsall and J. Birdsall, Leeds—Imp. in preparing hides or skins for tanning.

Dated 18th February, 1862.

492. C. D. Ségoffin, 4, South-street, Finsbury—An improved apparatus for the purpose of viewing photographs on cards.

Delivered 19th February, 1862.

437. H. B. Barlow, Manchester—Imp. in carding or otherwise preparing cotton and other fibrous materials and in machinery employed therein. (A com.)

438. J. Nasmyth, 31, Rue de l'Etoile, Brussels—Imp. in apparatus for obtaining a circular motive power.

442. J. Turner, 194, Upper Thames-street—Improved machinery for mixing, mincing, and pounding materials to be used in the preparation of food.

443. W. Hinton, Greville-street, Holborn—Imp. in barometers.

445. J. Paterson, Middle Temple—Imp. in means or apparatus for re-burning animal charcoal. (A com.)

447. G. T. Bousfield, Loughborough-park, Brixton—Improved modes of protecting iron boilers, tanks, and vats from wear arising from galvanic action.

Dated 20th February, 1862.

449. G. F. Lee, New Bridge-street—An imp. in tourniquets. (A com.)

453. J. Bleasdale and F. W. Borland, Accrington—Imp. in fluted rollers for preparing and spinning fibrous materials and in the mode of manufacturing the same.

455. J. Paterson, Middle Temple—Imp. in the use of animal charcoal. (A com.)

457. C. Wood, Bramford, Suffolk—Imp. in horse rakes.

Dated 21st February, 1862.

461. H. Ward, Castle Bromwich—An imp. or imps. in ladies saddles.

463. W. Hamer, Little Lever, near Bolton—Imp. in apparatus employed in the preparation of cotton and other fibrous materials.

464. E. S. Crease, 17, Gracechurch-street—Improved machinery for drilling, boring, or excavating rock or other earthy substances.

466. J. Krasuski, 29, Boulevard St. Martin, Paris—An improved apparatus for controlling fiery horses.

Dated 22nd February, 1862.

473. A. Bornemann, 29, Mowmouth-street, Bath—Imp. in the mode of constructing fountains.

477. J. Townend, Bradford—Imp. in jacquard engines.

479. D. B. White, Newcastle-on-Tyne—Imp. in apparatuses for protecting liquids from the atmosphere while remaining in and during their discharge from the vessels containing the same.

481. G. J. Oram, 19, Wilmington-square—A revolving pendant for giving greater security to watches and lockets against theft.

483. W. B. Johnson, Manchester—Imp. in steam engines.

Dated 24th February, 1862.

485. W. Johnston, Glasgow—Imp. in gas and other lamps and stoves.

487. J. Cunningham and R. Cunningham, Paisley—An improved ornamental fabric, and imp. in weaving, and in jacquard apparatus.

488. J. C. Haddan, Bessborough-gardens, Pinlco—Imp. in small arms and in artillery, and in projectiles for artillery.

491. W. Clark, 53, Chancery-lane—Imp. in apparatus for feeding or supplying steam boilers with water. (A com.)

493. P. G. B. Westmacott, Newcastle-on-Tyne—Imp. in constructing and applying armour plating to ships, vessels, and forts.

495. L. Davis, Gloucester-gardens, Hyde-park, and F. M. Parkes, Marylebone-road—An imp. in the production or manufacture of gas for lighting and heating.

496. R. A. Brooman, 166, Fleet-street—Imp. in reaping and mowing machines. (A com.)

497. F. St. George Smith, Drogheda, Ireland—Imp. in machinery for grinding or reducing quartz, bones, grain, and other substances. (Partly a com.)

Dated 25th February, 1862.

503. J. Piddington, 52, Gracechurch-street—Improved condensing apparatus adapted for high pressure steam engines, especially locomotive engines. (A com.)

505. W. Clark, 53, Chancery-lane—Imp. in tobacco pipes. (A com.)

506. T. Watson and R. Dracup, Thornton, near Bradford—Imp. in means or apparatus for preparing and combing wool and other fibres.

511. W. M. Cranston, 58, King William-street—Imp. in machinery for reaping and mowing. (A com.)

512. C. Kingsford, Fenchurch-street—A new composition for the manufacture of bread.

513. P. J. Guyet, Paris—An improved coupling for uniting pipes between locomotives and tenders, applicable also to the coupling of other pipes.

514. H. W. Cook, Manchester—An improved mode of and apparatus for propelling carriages and vehicles by means of electricity.

Dated 26th February, 1862.

515. J. Boocock and T. Davenport, Bury—Imp. in machinery for preparing, spinning, and doubling cotton and other fibrous materials.

517. A. Stephen, jun., Glasgow—Imp. in the construction of ships or vessels.

523. T. King and R. Varvill, Liverpool—Imp. in apparatus for controlling the flow of fluids for flushing water-closets.

525. W. Miller, Upper Stamford-street, Blackfriars—Imp. in the manufacture of sugar.
 527. W. Clark, 53, Chancery-lane—Imp. in the clasps or fastenings of bracelets, neck chains, and other articles of jewellery. (A com.)
 529. W. P. Savage, Roxham, Downham, Norfolk—Imp. in fire arms.
 531. J. Smith, sen., Coven, near Wolverhampton—Imp. in drying wheat and other grain.

Dated 27th February, 1862.

535. W. A. Gilbee, 4, South-street, Finsbury—Imp. in the construction of fire grates for steam and other boilers. (A com.)
 536. W. Smith, Salisbury-street, Adelphi—Imp. in the method of making cigarettes, and in the apparatus employed therein. (A com.)
 537. J. Tangye, Birmingham—An imp. or imps. in hydraulic lifting jacks.
 539. T. Bray, Dewsbury—Imp. in ornamenting wood, in imitation of inlaid work.
 541. J. R. Foster, Winsley-street, Oxford-street—Imp. in the manufacture of bullion-fringe or cord.
 543. J. Revell, Dukinfield, Cheshire—Imp. in oil cans.

Dated 28th February, 1862.

544. P. D. Azemar, Paris—An improved mechanical arrangement for the winding up and the setting of the hands of watches by means of the knob of the pendant.
 545. W. H. Muntz, Millbrook-lodge, Hants.—Imp. in paddle wheels.
 546. A. W. Makinson, Westminster, and W. F. Batho, Birmingham—Imp. in locomotive engines.
 547. J. C. Hatcliff, Coventry—Imp. in the covers or bindings for books and blotting cases.
 548. G. McKenzie, W. F. Murray, and J. Hamilton, Glasgow—Imp. in machinery or apparatus for the manufacture of bobbins or holders for textile materials.
 549. J. Pollock, 27, Budge row—Imp. in apparatus for protecting trousers from mud.
 550. J. L. Charcouchet, Lyons, France—Imp. in machinery for breaking stone.
 552. J. Parker, 6, Lifford-road, Camberwell, Surrey—An improved mode of applying steam as a motive power for propelling vessels, and for other purposes.

Dated 1st March, 1862.

553. T. Cowburn, Little Peter-street, Manchester—Imp. in apparatus for raising and discharging boiling soap, and for dividing the same into bars when coagulated.
 554. T. Bradford, Manchester—Imp. in washing machines for cleansing domestic garments, fibrous materials, and for manufacturing purposes.
 557. M. Dodds, Hamsterley, Durham—Imp. in machinery for moulding, forming, or shaping articles of iron or other malleable metals, and for shearing and cutting such metals.
 558. P. H. Boyer, Paris—Imp. in the manufacture of boots and shoes.
 560. M. Gabriel and A. Gabriel, 33, Ludgate-hill—Imp. in the bases of artificial teeth.
 561. S. Hague, Nottingham—Imp. in machinery or apparatus for raising hammers and stamping with them hot or cold metals.
 562. A. E. Ragon, 4, Bernard-street, Russell-square—Imp. in electric alarms for telegraphic purposes. (A com.)
 563. A. Potts, Cappagh, Down, Ireland—Imp. in machinery or apparatus for scutching and refining flax, hemp, and other vegetable substances.
 564. P. Robinson, Sun-court, Cornhill—Imp. in treating yeast and in the manufacture of ammoniacal salts and a substitute for animal charcoal.
 565. S. G. Reynolds, Bristol—Certain imp. in power spading machines.
 566. J. G. Jennings, Holland-street, Blackfriars—Imp. in the construction of chimneys or flues.
 567. J. B. Kendall, Boston, U.S.—An improved horse shoe.
 568. L. Martin, Tenison-street, York-road, Lambeth, and O. Penfold, Blackmoor-street, Drury-lane—An improved candle-lamp.
 569. C. Boulds, South-terrace, Kennington-park—Imp. in fastenings for gloves.
 570. J. W. Davis and F. Davis, Hull—Imp. in apparatus for supplying feed water to steam boilers.
 571. H. Bowen, Cardiff—Imp. in gas meters.

Dated 3rd March, 1862.

574. T. Bell, Wishaw, Lanark—Imp. in apparatus for distilling shale and other bituminous materials.
 575. A. Sheldon, Tipton, and J. Sheldon, West Bromwich, Staffordshire—An imp. or imps. in smelting furnaces.
 576. J. Schofield, Huddersfield—Imp. in looms for weaving.
 577. A. Tevendale, Liverpool—Imp. in the apparatus used in connection with cooking stoves and domestic fire-places for the manufacture and supply of gas.
 579. A. Bedborough, Southampton—Imp. in pillar letter boxes and letter bags.
 580. J. B. A. Quinquandon, Paris—Imp. in Jaquard machines, and in the pattern cards to be employed therein.
 581. G. Bischof, jun., Swansea—Imp. in treating ores and solutions containing copper and iron or either of them to obtain products therefrom.
 582. W. Conisbee, Herberts building, Waterloo-road, Southwark—Imp. in colour printing machines for letter-press or block printing.

583. H. Bunning, Field-house, New-cross, Deptford—Imp. in the manufacture of lubricating grease or compounds.
 584. F. B. Houghton, 6, Clarendon-terrace, Kensington—Imp. in the manufacture of paper.

Dated 4th March, 1861.

587. B. Standen, Salford, near Manchester—Imp. in the preparation or manufacture of portable manure or fertilising compound, and in the collection or extraction therefrom of a certain liquid applicable to various purposes, and also in machinery or apparatus to be employed therein.
 588. P. Schafer and F. Schafer, Golden-square—An imp. in travelling bags, portmanteaus, and other similar bags and cases.
 589. J. T. Smith, Lee, Kent—An improved sight for fire arms, applicable also as an apparatus for measuring angles.
 590. W. Tongue, Bradford—Imp. in machinery for breaking, rubbing, and scutching flax, hemp, or other vegetable fibrous materials, and in processes for treating silk waste.
 591. A. J. Sedley, 210, Regent-street—Imp. in metallic bedsteads, sofa-bedsteads, and folding chairs or seats.
 593. T. Greenwood, Leeds—Imp. in sewing machines.
 594. G. F. Guy, Bury St. Edmonds—Imp. in electro-magnetic motive power engines.

Dated 5th March, 1862.

596. W. Tongue, Bradford—Imp. in machinery for preparing silk, flax, hemp, or other fibrous materials.
 600. T. Bostock, Stone, Staffordshire—Imp. in the manufacture of boots and shoes.
 602. F. N. Gisborne, 3, Adelaide-place, London-bridge—Imp. in the mode of indicating numerals or letters in railway tickets and other articles by peculiar devices cut therein, and in apparatus for effecting the same.

Dated 6th March, 1861.

604. J. Barker, Todmorden, Yorkshire—Imp. in, and means or apparatus for, casting drums, pulleys, gear, and other wheels and bushes or keys for same.
 606. T. Hack, Hammersmith, and A. Carter, Kensington—Imp. in screw cocks.

PATENTS SEALED.

[From Gazette, March 14th, 1862.]

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| <i>March 14th.</i> | 2321. J. Lee and B. D. Taplin. |
| 2298. T. Morris, R. Weare and E. H. C. Monckton. | 2323. G. White. |
| 2300. S. Horsley and E. H. Jones. | 2328. E. Partington. |
| 2302. W. E. Gedge. | 2331. E. Suckow and E. Habel. |
| 2312. F. M. Ransome and E. L. Ransome. | 2333. L. G. A. Condroy. |
| 2315. F. Wrigley. | 2341. W. T. Tongue and J. Greer. |
| 2316. F. Barnett. | 2342. J. H. Wilson. |
| 2319. G. Davies. | 2350. A. J. Sedley. |
| 2320. J. Statham and W. Statham. | 2390. T. Bright and R. Mills. |
| | 2589. T. E. Merritt. |
| | 2740. E. A. Maling. |
| | 15. J. Howard E. T. Bousfield. |

[From Gazette, March 18th, 1862.]

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| <i>March 18th.</i> | 2376. J. Price. |
| 2339. E. Brecht. | 2377. J. Jacob. |
| 2347. R. P. P. Dagron. | 2381. G. J. Gladstone. |
| 2351. J. Oliver, J. Grantham, W. Sinnock, and M. R. Levenson. | 2391. H. Purnell. |
| 2353. J. C. Davidson. | 2416. J. Kimberley. |
| 2355. J. Burnard. | 2422. J. A. Knight. |
| 2359. F. W. Wymer. | 2440. F. Walton and R. Beard. |
| 2362. C. Board. | 2486. J. Tweedale. |
| 2363. H. Cockey & F. C. Cockey. | 2548. S. R. Carrington. |
| 2365. W. Stableford. | 2632. J. H. Johnson. |
| 2368. S. Desborough. | 2802. T. C. Darby. |
| 2369. J. H. Duley. | 3201. T. Green, W. Green, and R. Mathers. |
| 2373. H. Briensmead. | 298. W. E. Newton. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, March 14th, 1862.]

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| <i>March 10th.</i> | <i>March 12th.</i> |
| 653. W. Clark. | 641. R. A. Brooman. |
| <i>March 11th.</i> | 761. G. Hazeltine. |
| 631. J. Cunliffe, F. Piggott, and G. Mallinson. | |

[From Gazette, March 18th, 1862.]

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| <i>March 13th.</i> | <i>March 14th.</i> |
| 706. W. C. Cambridge. | 640. R. Waller. |
| | 649. W. Langton. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, March 14th, 1862.]

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| <i>March 11th.</i> | <i>March 12th.</i> |
| 555. J. M. Napier. | 547. E. J. Mitchell. |

[From Gazette, March 18th, 1862.]

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| <i>March 13th.</i> | <i>March 14th.</i> |
| 571. J. Marland. | 741. P. R. Jackson. |
| <i>March 14th.</i> | 801. S. Holt. |
| 647. J. Willis. | <i>March 15th.</i> |
| | 845. E. E. Allen. |

Journal of the Society of Arts.

FRIDAY, MARCH 28, 1862.

INTERNATIONAL EXHIBITION OF 1862.—SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

INTERNATIONAL EXHIBITION OF 1862—GUARANTEE.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £447,600, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The progress of the contractors towards the completion of the building may now be said to be measured by the time occupied in removing the ponderous timber of the dome scaffolds. This has proceeded satisfactorily during the week, and by the time that the *Journal* is in the hands of the members it is probable that almost the whole of the eastern dome scaffold will have disappeared.

The visitor in two or three days will be able leisurely to contemplate the full magnificence of the dome, and criticise its decorations, without ascending dizzy heights, or running the risk of being crushed by falling timbers. That Mr. Crace has been successful in this last most difficult and most important part of his work is very generally admitted.

Immediately under the lantern shines forth the gilded pendant, from which golden rays, on a bright blue ground, shoot out. The colour of the ribs is strictly in keeping with the roof of the nave, and the rich capitals from which they spring are a mass of gold. To give prominence and strength to the two-foot columns, they are coloured with a dark chocolate, which has the desired effect, and at the same time affords a pleasing contrast to the smaller ones which cluster round them. Mr. Costa has given in his plans for his orchestra of 2,000 performers, which will be erected under the eastern dome.

The removal of the western dome scaffold will probably be completed next week; the appliances for taking down the scaffolding may now be seen in full action; they are very simple, the planks being dropped down through a shoot, while the heavy timber is carefully lowered by tackle fixed at the apex of the dome.

The late continued rains have come fortunately to show the weak points of the roofs, which have in many places been found leaky, especially the gutters of the glass courts. This causes no uneasiness, and the contractors are doing their utmost to render them water-tight, and have organised gangs of men whose sole duty it is to watch and repair the leaks. The building will be far more water-tight than the Crystal Palace.

The refreshment rooms in the south arcades are rapidly advancing towards completion, and the Horticultural fete of the 19th inst. gave a good idea of what the beauty of the scene will be in the Summer from this part of the building.

English exhibitors are beginning to work in full earnest; their goods are now fast arriving, and considerable progress has been made during the week in erecting counters, partitions, &c. The jewellers are very forward. Since 1851 the celebrated Koh-i-noor diamond has been re-cut, and it is understood that Her Majesty the Queen will cause it to be exhibited.

Prominent amongst the latest arrivals is a gigantic piece of shafting forged at the Mersey Steel and Iron Works; it weighs 25 tons, and was brought to the ground by 24 horses, in a truck weighing 10 tons.

The last overland mail brought various packages containing specimens of the produce of our Indian Empire.

The first case opened in the British side of the building is one from the Admiralty, containing a beautiful model of H.M.S. "the Queen." This is one of a series, lent by this department, to illustrate the progress in naval architecture and construction, from the earliest date up to the present iron age. If report, however, speaks true, none of these will surpass the model of the "Warrior," which is being prepared at the Thames Iron Works.

Mr. Redgrave, R.A., aided by Mr. Creswick, R.A., and by Mr. S. Redgrave, have nearly hung the British pictures in the large compartment of the building which will eventually belong to the Society of Arts. The light proves admirable, and the works of our great masters will be seen to perfection. The Foreign Gallery, however, is still backward, and shows nothing but blank walls. No time should be lost in commencing this portion of the work.

To judge of the comparative amount of work to be done, the machinery department in the western annexe has the most laborious task of all before it, and it will require the most unremitt-

ting exertions during the next six weeks to bring into some order the present chaos which here meets the eye.

UNITED STATES.

Colonel Johnson will shortly arrive in this country to act as Commissioner on behalf of the exhibitors from the United States. All communications are to be addressed, in the meantime, to Mr. J. E. Holmes, 17, Norfolk-street, Strand, W.C.

EXAMINATIONS, 1862.

NOTICE TO LOCAL BOARDS.

The attention of Local Boards is particularly drawn to Par. 14 of the Examination Programme, as follows :—

14. The previous examinations must be held by the Local Boards sufficiently early in the year 1862 to allow the results to be communicated to the Council, on a form which will be furnished on application, on or before the 23rd April, *i.e.*, four weeks before the commencement of the final examinations.

Any Local Boards expecting to have Candidates desiring to be examined in music, should apply to the Secretary of the Society of Arts without delay, who will furnish them with a copy of a form of test to be used at the Previous Examinations, as mentioned in paragraph 112 of the programme.

GENERAL MEETING.

FRIDAY, MARCH 21, 1862.

A General Meeting of this Society was held on Friday, the 21st inst., duly convened in accordance with the Bye-laws, upon the following requisition received by the Council :—

TO THE COUNCIL OF THE SOCIETY OF ARTS.

We, the undersigned Members of the Society for the Encouragement of Arts, Manufactures, and Commerce, request you to call a General Meeting of the members on an early day, for the purpose of recording their sense of the loss of their President, the late Prince Consort, and of considering the propriety of having a Memorial of his late Royal Highness in the Society's House; and further, if the latter proposition be then agreed to, of appointing a Committee to decide on the most appropriate form of the Memorial, with full power to take such steps as they may think necessary for carrying out the same.

Dated this 26th day of February, 1862.

J. H. Murchison.
Wm. Williams.
R. Webster.
Jas. Copland, M.D., F.R.S.
John Hunt.
Charles Fox.
T. Marsh Nelson.
R. W. Crawford.
Lionel De Rothschild.
John Hawkshaw.
Thomas Brassey.
Ashburton.
R. I. Murchison.
R. N. Fowler.
J. J. Mechi, Alderman.
H. C. Salmon.
H. Horne.
Radstock.

Wm. Coulson.
John Fleming.
W. S. Lindsay.
Warren S. Hale, Alderman.
W. H. Ashurst.
R. M. Christie.
Joseph Causton.
John S. Pakington.
Samuel Gurney.
David Salomons, Alderman.
W. H. Sykes.
Stephen W. Lewis.
Dominic Colnaghi.
C. Locock Webb.
M. Marshall.
J. Y. Watson.
Charles Atherton.

Sir THOMAS PHILLIPS, Vice-President of the Society and Chairman of the Council, having taken the chair, the Secretary read the requisition and the advertisement convening the meeting, as well as the following Report of the Council, which had been previously circulated amongst the members :—

The Council having received a requisition, duly signed in accordance with the Bye-Laws, requiring a Meeting to be called "for the purpose of recording their sense of the loss of their President, the late Prince Consort, and of considering the propriety of having a Memorial of His late Royal Highness in the Society's House; and, further, if the latter proposition be then agreed to, of appointing a Committee to decide on the most appropriate form of the Memorial, with full power to take such steps as they may think necessary for carrying out the same," have convened this Meeting accordingly.

In making this announcement, the Council desire to add, for the information of the Meeting, the steps taken by the Council to represent the Society on the loss of their lamented President. At a very numerously attended Council Meeting, held on the 18th December, 1861, an Address of Condolence was voted to Her Majesty, under the Seal of the Corporation, the only recognised and usual form of an Address to the Crown by an incorporated Body. This address was among the first laid before the Queen, and was published in the *London Gazette* of the 31st December, and in the Society's *Journal* of the 27th December, 1861.

Further, when the question of a National Memorial to the Prince was raised, and a Meeting was called on a short notice, by the Lord Mayor, the Council, specially summoned, voted 1,000 guineas as the contribution of the Society of Arts to this Memorial, a vote which was unanimously approved by a General Meeting, held on the 7th February.

Whilst the Council would not pretend to prescribe or influence the course of action of individual Members of the Society on this occasion, the Council express their opinion that, in the first instance at least, the form of a Memorial chosen by Her Majesty is most deserving of support; and they venture to think that at present it is better to support the erection of the National Memorial to the Prince Consort, for which subscriptions are in progress of collection, than to engage in any separate Memorial which might detract from that greater object.

Sir JOHN PAKINGTON, Bart., M.P., said he had great pleasure in rising to move the first resolution, which was as follows :—

"That, cordially approving of the address of condolence presented by the Council to the Queen, and also of the vote of 1,000 guineas from the funds of the Society to the National Memorial, the members of the Society of Arts, in this general meeting assembled, are anxious further to record their deep sense of the irreparable loss which the Society, in common with the Queen and nation, has sustained by the most afflicting dispensation which has deprived it of its illustrious President, the Prince Consort, and this Society, being under peculiar obligations to His Royal Highness, whose zealous devotion to its interests was unceasing during the 18 years of his enlightened presidency, the members desire to testify their estimation of his great services and high qualities, by having a special memorial for the Society."

He had great pleasure in submitting this resolution to the meeting, as he had also had great pleasure in signing the requisition by which this numerous and influential meeting had been convened, from the very strong feeling which he entertained that it was impossible for this Society—and he might say for any society—too strongly to mark its sense of the great loss which they and the nation at large had sustained by the death of that great and admirable man the Prince Consort. He thought it necessary, before he made any further remarks in introducing this resolution to their notice, to make some reference to the report of

the Council which had just been read by the Secretary. After stating their acquiescence in the requisition which had been forwarded to them, the Council in the latter part of their report expressed their opinion that, in the first instance, the form of memorial chosen by her Majesty was most deserving of support, and they ventured to think, at present, it was better to aid in the erection of the National Memorial, for which subscriptions were in progress, than to engage in any separate memorial which might detract from that greater object. Now, as the language of that report might seem to imply, on the part of the Council, something like dissent from the object for which they were assembled, he was desirous at the outset to express his most earnest and anxious hope that this great Society would not be the first to show among themselves anything like a difference of opinion upon a subject on which, he ventured to say, if ever there was a unanimous feeling throughout all classes of the people, it was upon this; and let them add his own individual feeling, as a member of this Society, that he entirely agreed with the opinion expressed by the Council, that it was best, in the first instance at least, to support the Memorial chosen by her Majesty. He entirely approved, as a member of the Society, of the steps which the Council had taken in this respect; he thought they had discharged their duty well, and in a manner which every member would approve, when they adopted the address of condolence to her Majesty, and when further they proposed to vote the splendid donation of one thousand guineas towards the national memorial. He was heartily glad that the Council had adopted that course; but if he rightly understood the object for which they were now assembled, it was one which was not in the least inconsistent with the course the Council had already taken. It arose, he believed, from a feeling which existed in the minds of certain members of the Society—and he was free to admit he was one—that, considering the prominent connection of the lamented Prince with this Society, it might be well that they should mark their deep sense of the loss they had sustained by adopting some memorial of the Prince peculiar to themselves. He had heard it said that it was not desirable to promote minor memorials in different localities. He was quite of that opinion; as a proof of it he had himself discouraged, in the county with which he was more particularly connected, the attempt to collect subscriptions for a local memorial, and he had joined the great majority of leading gentlemen in the county in urging upon his neighbours that it was better for individuals to subscribe to the general fund, and thereby swell the amount towards that national testimonial. But he regarded the proposition now submitted to this Society in a very different light. He could not consider the members of this great Society in the same light that he regarded the inhabitants of any particular local district in the country. In those localities and districts the question would undoubtedly arise—"Well, I am called upon to subscribe to a memorial to the Prince Consort, shall I subscribe to a local one or to the national one?" He thought that was an unwise question to raise in any direction. He thought the wise and prudent course was to swell as much as they could the central fund for the national memorial. But in this respect the Society of Arts had done its duty. He believed there was no public body or any single person who had subscribed more munificently and more liberally than the Society of Arts had done towards the national memorial, and the question now before them was simply whether or not, in the opinion of the members duly convened by the Council to consider the subject, it was not desirable to adopt some memorial peculiar to themselves. He confessed that he was quite of that opinion, and he earnestly hoped that the influential meeting he saw around him—including those who were members of the Council and those who were not—would agree that they might safely adopt this proposition, and thus give a marked proof of their respect for the memory of their late

president, without in the least interfering with or prejudicing in any way that which had been so wisely and properly determined by the country beforehand. He was sure at this moment, and after the lapse of time that had taken place, it was unnecessary for him to dwell otherwise than in general terms upon the claims of the late Prince Consort upon this country, or his peculiar claims upon this Society; but he could not help adverting to a paper which he held in his hand, which was an extract from the report* of the Council to the general meeting held last month, having reference to the donation of a thousand guineas to the national testimonial. In this report the present prosperous condition of the Society was set forth. He doubted whether any instance could be found of a more marked progress on the part of any public institution during the same period of time. He would not say—he thought it would be presumptuous to say, in these days of progress—that this great Society, considering its objects, might not have made very considerable advances during that period of time, whether or not the Prince Consort had been connected with it; but he did think it was reasonable and fair to believe that a very considerable proportion of this remarkable progress might be attributed to the deep and active interest which the Prince Consort uniformly took in the welfare and objects of this Society; and let him remind them for a moment that, if there was one respect more than another in which the influence of the late Prince was beneficially felt in this Society, it was in the desire he expressed, and in the influence he exercised, to bring about that most desirable object of the application of the Fine Arts to the improvement of the manufactures of this country. That was an object always much promoted by the Prince, and much pressed by him upon this Society, and under his wise and able guidance he believed that object had been very successfully prosecuted by the Society of Arts. As he had already said, he must not dwell upon the claims of that great and lamented man; the loss had been one of the severest misfortunes which for a long period of time this country had sustained. That feeling of acute grief with which the first tidings of his death were received in every part of the country, of course had, to a certain extent, now subsided, but he believed there would long remain a deep settled feeling of sorrow for a loss which it was impossible for them to supply. He believed they all felt—he believed the nation felt, that from day to day, and from year to year, they should have cause to lament the loss of the beneficial influence which he exercised so unostentatiously, so modestly, but so wisely and so well. It was impossible to overrate that loss, and his estimate of it was so great that he could not help saying he regarded it as a loss in the consideration of which there was almost everything to aggravate its magnitude, and only one consideration of an opposite character. He alluded to the extreme satisfaction which he thought every man must have felt—at least he had very strongly felt it—at the manner in which the whole nation had felt the magnitude of this loss. He thought it had been one of the most remarkable proofs that could be afforded of the soundness of the national character of England that the loss of that great man had been appreciated and lamented as it had been. In the feeling of general sorrow and regret there had been mingled two distinct elements. In addition to the public sense of the great merits of the Prince, there had been a deep-felt sympathy with the sorrows of our Queen. It was only from that consideration that we derived any consolation in the loss we had sustained. In saying these few words, he believed he was only giving expression to feelings un-animously entertained by the nation at large, and there was no part of the nation, and no public body in the nation, by whom this loss ought to be more deeply and un-animously felt than by the members of the Society of Arts, and therefore he hoped the proposition he now submitted would meet with their unanimous approbation.

* See present Vol. of the *Journal*, page 183.

Sir FITZROY KELLY, M.P., said he rose to second the resolution which had been submitted by his right hon. friend Sir J. Pakington, and, considering it was comparatively for a short period of time that he had had the honour of being a member of this Society, he could not but feel flattered at thus having an opportunity of addressing them on an occasion like the present. If that resolution which he had the honour to second was merely to perpetuate the name and memory of the Prince, whose loss they deplored in connection with this society, he for one should have felt perfectly satisfied that any efforts to that end were entirely unnecessary and superfluous; that they need but look to the acts he had done or even to the words which he had spoken, as recorded in their annals, and constituting a part, and an important part, of the history of the country during the period they had had the happiness to see him live and act among them, to immortalise his name in connection with this great Society. But inasmuch as it was in the particular character of President of this Society, and in actual and personal communication with, and with the aid of its members, that some of the greatest of those acts conferring benefits and blessings upon the people of this country, by which his eminent career was distinguished, had been done, he could not but feel that every individual amongst them must desire to see his connection with the Society commemorated and perpetuated by some act immediately emanating from themselves, and by which they could testify and perpetuate the respect and admiration which they felt for his memory. His right hon. friend had called attention to a recent report which had been laid before the Society, showing the great advances it had made, and the large sphere of its operations during the period the Prince Consort was its President. He might venture to remind them that—although at the time the Prince Consort became their President their efforts had been directed to the advancement and improvement of the arts and manufactures of this country—it was he who first suggested that which, under his auspices and with the aid of this Society, had been so largely and in so eminent a degree carried into practical effect; that while our manufactures already were distinguished amongst those of the nations of the world by solidity and strength, it was the Prince Consort who first suggested, through the instrumentality of this Society, that the higher arts, and all that would tend to promote a better taste in these manufactures, should be added to their other merits of strength and workmanship. But it was not only in their relation to the arts or the manufactures connected with the commerce of the country that the efforts of the Prince were crowned with such remarkable success. It was to him and to his suggestion alone, in the first instance, that the great idea was due of the Exhibition of the Industry of all Nations. It was as early as the year 1845 that the Prince first, in personal communication with some members of this Society, suggested that idea, and although the difficulties to be overcome were enormous, although the task appeared at first almost impracticable, the Prince, with the aid of the Society, and those whose assistance he invoked for that great purpose, at length triumphed over every obstacle, and his efforts were crowned with success in the Great Exhibition of 1851. It was also through the aid of the Prince, and with his countenance, that all the steps were taken by this Society for establishing the Exhibition which was now about to be held in this country, and the opening of which, without him to preside over it, would indeed call to their sorrowful recollection the loss, the irreparable loss, they had sustained. He was not aware that there could be any difference of opinion; he was not aware that there was one amongst them who could hesitate, considering the intimate relation between the illustrious Prince and the Society, at once to accede to the resolution proposed by his right hon. friend, and to take care that by some special mark of their regard, respect, and affection, emanating immediately from themselves, the connec-

tion of the Prince with this Society should be commemorated. It was upon these grounds, with great satisfaction, he seconded the resolution proposed by his right hon. friend.

The CHAIRMAN having read the resolution,

Mr. G. GODWIN, F.R.S., said the report from the Council led him to infer that they did not think this step necessary. He wished to know whether the resolution just proposed emanated from the Council or not?

The CHAIRMAN replied that the Council did not object to the resolution which had been proposed. The Council certainly did themselves entertain considerable doubt of the desirability of bringing forward this proposition until all the funds required for the great national memorial were subscribed; and for that reason they had not originated a meeting for this purpose, but inasmuch as the proposal had acquired the adhesion of many members of the Society, the Council were entirely in the hands of the meeting, having laid before them their views, to deal with the question as the members at large thought fit.

Mr. PHILIP PALMER inquired whether, in the event of a committee being appointed, it would consist jointly of the Council and the members of the Society, or of members only.

The CHAIRMAN replied that the second resolution had direct reference to that subject.

Mr. JOHN JONES concurred in the opinion expressed by the Council that the better plan would have been to have waited till the national memorial was completed, and if it were such a work of art that it would be desirable to have a copy of it as a memento of his late Royal Highness within their own building, they might vote funds for the purpose.

Capt. HUMBY inquired whether this resolution bound the funds of the Society to the object contemplated?

The CHAIRMAN replied in the negative, but it would be the resolution of the whole Society, inasmuch as the meeting had been convened in accordance with the bye-laws. It was not, however, the province of a general meeting to dispose of the Society's funds.

Capt. HUMBY begged to ask further whether or not it was still the opinion of the Council that this movement was likely to interfere with the national monument?

The CHAIRMAN replied that the Council had not opposed the introduction of the resolution which had just been proposed, coupled as it was with a second resolution, which would be shortly laid before them, and which left the time for carrying out the proposed memorial in the hands of the Council. They still adhered to the opinion expressed in their report, that, "*at present*, it was better to support the national memorial."

Mr. WESTMACOTT, R.A., said his feeling as an artist, and as having had the honour of being much connected with his Royal Highness, whose loss they deplored, was that he would join in any measure to show his admiration of his character, and his sincere regret for his loss. But he caught one expression in the address of Sir John Pakington which had a great effect upon his mind—that was, as to the inexpediency of coming to a division upon this subject. He was sure, although there might be difference of opinion as to the question of time, there was no difference upon the principle, which was admitted on all sides, and he was sure that all present would agree with him that any division upon this subject should be specially avoided, and that the views of the Council, as the governing body of the Society, should be supported.

The Marquis of SALISBURY, K.G., hoped, although a humble member of the Council, he might be permitted to interpret his own feelings in reference to the meeting of to-day. There could be but one feeling on the part of the Council—to show every mark of respect that could be shown to one to whom this Society, and the country at large, were so much indebted, but it appeared to some of the Council—and to himself amongst the number—that it would have been better if further time had been given before the Society came to a resolution for any individual mark of their respect to the memory of their late Presi-

dent. It was with that view he believed the Council had come to the conclusion that it was desirable to delay this mark of respect rather than to bring it forward at the present moment, but worded as the resolutions now were, the Council could have no possible objection to them. The second resolution would make it quite clear that the propositions as a whole to be made to the meeting were in harmony with the report of the Council which they had just heard.

Mr. GEORGE GODWIN felt that it was a most unfortunate movement just at the present time. A number of circumstances had concurred to lessen the amount subscribed towards the national monument. The munificent sum contributed by the public in relation to the disastrous accident at the Hartley Colliery, he had no doubt had in some measure operated in the manner he had suggested. As a member of the committee for the national monument he expressed that opinion. The desire which had been expressed in several large towns, such as Manchester and Liverpool, to have memorials of their own, had also concurred, in his opinion, to render the amount subscribed up to this time decidedly small. The amount at present was only £41,550—altogether too small to do that which had been suggested by her Majesty and was desired by the nation; therefore, he said, with the most anxious desire that this Society hereafter should do all in its power to mark its sense of the character of its late President, he earnestly begged the mover of the resolution to withdraw it, solely upon the important considerations which he had endeavoured to urge.

Professor OWEN, F.R.S., concurring as he did with every member present in the main object for which they had been called together, thought the present time was inopportune and unfortunate. He had no doubt the time would come, and that ere long, when they would concur in having a memorial of that enlightened, patriotic, and excellent Prince, through whom the prosperity of this Society had been so much advanced; but at the same time he concurred in the opinion expressed by the last speaker that such a proposition at the present time would tend to affect the progress of the great national memorial.

Sir JOHN PAKINGTON begged permission to say a few words in explanation. He would in the first place reiterate the strong desire which he felt, and which he was sure was shared by all in the room, that they should be unanimous in their proceedings. He collected from what had passed that if there was any difference of opinion, it was entirely as to the question of time, and he thought that could not go too distinctly forth to the public. That being the case, he might be allowed to add that when he consented to take a part in the proceedings of this day he did so without the least idea that there was any difference of opinion with regard to time or anything else likely to arise. If there was any difference of opinion between the Council and those who had signed the requisition for this meeting, he felt very strongly what had fallen from Mr. Westmacott, that the governing body of this Society must be duly supported, and he for one should strongly object to take any course inconsistent with the views of the Council. With regard to the appointment of a committee to carry out this object he felt that whenever this Society determined upon having a memorial of its own of their late illustrious President, it should be left in the hands of the Council to carry out this object. He was happy to find that that principle had been recognised, and had been embodied in the second resolution, and he need not add that such a proposition would have his cordial concurrence.

Mr. Alderman SALOMONS, M.P., deprecated any division on the subject, and suggested that the combining of the two resolutions as one would meet the views of all present. That would leave it in the hands of the Council to fix the time when active measures should be taken towards carrying out the object they have in view.

The CHAIRMAN having asked the opinion of Sir John Pakington upon this suggestion,

Sir JOHN PAKINGTON believed the meeting generally was not aware of the terms of the second resolution, and therefore he would read it. It was as follows:—

“That the Council be requested to consider the most appropriate form of the Memorial, and bring the matter before a meeting of the members at a fitting time.”

That was intended as the second resolution, and he should be most happy to concur in the suggestion of his hon. friend Mr. Alderman Salomons, and he hoped this would have the effect they desired of promoting unanimity.

Mr. J. SCOTT RUSSELL, F.R.S., said having been entrusted with the moving of the second resolution, he had felt all along, that if those gentlemen who appeared disposed to go to a division had known the manner in which it was intended to carry out that which he knew was the unanimous feeling of the meeting, there would be no further ground of difference. He had had the pleasure of being present at the previous meeting, at which this suggestion, he believed, originated; and he thought if members, who were rather disposed to oppose this resolution at present, only clearly understood how it originated, and how those with whom it originated intended and wished it should be carried out, they would leave this room perfectly unanimous. Those who were present at the former meeting would recollect that they were summoned together to express their opinion on what the Council had done in devoting one thousand guineas from the funds of the Society as its contribution to the great Memorial. They would remember that the Society gave their cordial approbation to this act of the Council, and therefore this Society, as a public corporation, had already done its duty in this respect through the Council, and had done all in its power, by example, to forward the subscriptions to the great Memorial. He knew he expressed the feelings of many old members when he said, if there were any difficulty in carrying out the great Memorial worthily, they were ready to come forward again as a corporation, and again to back the Council in any further resolution—he might say, in any further contribution from the corporate fund that they were willing to ask for that great purpose. Hitherto they had been perfectly unanimous in their action. They had done their duty as a public body, but they had not expressed their feelings of the domestic calamity (if he might so express himself) which had fallen upon them; and they felt that they wanted in this house, which had so often witnessed the exertions, the labours, the co-operation of the Prince with the members of the Society—that in this, the scene of their personal intercourse with him, they should have a fitting memorial expressive of their feelings as individuals. Now this was what they yet felt to be wanting. Then the question had arisen—how they should best do this without in any way interfering with the national memorial; and he might say that those who had promoted this movement held this view, that they should confine the subscriptions to be made towards this memorial rigidly to one guinea from each member. They knew they had a great many members, most of whom no doubt had already subscribed to the great national memorial; and he put it to the gentlemen present, if they were limited, by mutual agreement, to a single guinea for this special purpose, was there any gentleman there whose subscription of that one guinea would interfere with his subscription to the national memorial? He was very anxious that some plan should be adopted in which they might be perfectly unanimous. The next point was with reference to the committee. He was of opinion that it was desirable that some of those gentlemen who had interested themselves in this matter should form a committee conjointly with the Council; but he now learnt that the Council were quite willing to carry out the views of this meeting; that being the case, it appeared to him that by appointing the Council to carry out this resolution, they would at once become unanimous. He would only add that the second resolution should be attached to the first, and taken as part of it.

Mr. EDWIN CHADWICK, C.B., having been requested to second the resolution which had been originally placed in the hands of Mr. Scott Russell, but which it was proposed to incorporate with the first resolution, said that if ever there was a case in which they might defer unanimously to the views of the administrative body, it was on the present occasion, when the Council had so recently shown the high sense they entertained of the loss which the Society and the country had sustained. The Council had been acting for a number of years with the Prince whose loss they deplored, and to whom they had looked up for advice and assistance in all the concerns of the Society, and they were the best judges of the fitting time for carrying out the great object they all had in view. He would add that, in the exercise of that discretion, it was to be borne in mind that they were at the head of 300 Institutions, who would be interested in the decision which they came to to-day. Therefore, on every ground, if the second resolution were incorporated with the first, he should concur in it.

The CHAIRMAN then read the resolutions as combined, in accordance with the suggestion which had been made by Mr. Alderman Salomons.

Sir FITZROY KELLY, as the seconder of the resolution first proposed, was anxious, under the indulgence of the meeting, to say a word as to the ground on which he had consented to second the resolution. In the first place, he might say, as a matter of course, he had not the slightest idea of the possibility of any difference of opinion in any meeting of this Society upon the general principle of the resolution, and he rejoiced to add that he had heard nothing which led him now to suppose that any difference of opinion upon the principle existed; but with regard to the carrying of the resolution into effect, he would distinctly assert and assure the meeting that he never for a moment dreamt of that resolution being carried into effect by this Society otherwise than under the direction and sanction of the Council, both as to the time and as to the mode. Therefore, supposing the principle of the resolution to be agreed to, he was by no means inclined to think that this was the time that anything further should be done in the matter.

Captain HUMBY said his fear was, that, pending the subscriptions to the national memorial, this movement on the part of the Society might set an example to other bodies in getting up similar contributions. He was not opposed to the carrying out of the memorial in any shape they thought proper, but he did not think the time had yet arrived for its consideration. He therefore fully concurred in the concluding paragraph of the report from the Council.

Mr. R. K. BOWLEY said it was with diffidence that he intruded himself upon the notice of the meeting, but he confessed he had very strong feelings on this subject. Since receiving the circular with the report of the Council, he had thought a great deal upon it, and he had arrived at the conclusion that if the resolutions were carried it would have a prejudicial effect as regarded the national memorial. There could be no question that resolutions of this sort should be passed unanimously if at all, and he thought enough had passed to embolden him respectfully to ask the right hon. baronet to withdraw the resolution he had proposed. Let them, as a society, set the example that they had forborne the expression of their feelings of affection and respect to the memory of their late president in favour of the great national tribute that was to be erected in his honour.

Mr. S. R. SOLLY expressed his opinion that this monument would encourage other corporations to set up small memorials to the late Prince, and would prevent a proper amount of subscriptions towards the national testimonial.

Mr. PETER GRAHAM rose for the purpose of informing the meeting of a fact which many present might not be aware of, that was that in this house they had only a temporary habitation, as their lease would expire in six or seven years. The Society had far outgrown the accommo-

dation these premises afforded, and hence they should be under the necessity of looking out for others. On those grounds he thought time was an important element in the consideration of this question, and this had in some degree influenced the Council in the conclusion they had arrived at. He would neither counsel the withdrawal of the resolution nor vote against it, but he could not help saying he regretted extremely that this movement had been made at the present moment, because it would be the wish of the Society—certainly it was that of the Council—that when they had a memorial of the Prince it should be one worthy of his great and noble character, and of the importance of this society. They could not have that in the present building, but they might have it in a future one.

Mr. FREDERICK LAWRENCE regarded this proposition as one for a memorial not to the Prince Consort alone, but to the late President of this Society, and he could not for a moment suppose that any individual subscriptions for that purpose would militate in the smallest degree against the national fund now being raised. He was anxious that they should have something which they could call their own memorial of the Prince as their President.

Mr. BONNEWELL was anxious that they should have a memorial in the shape of a statue in their hall of meeting, of a character similar to those erected to the memory of the great masters of the law, which were to be found in the Inns of Court.

Mr. JOHN MACGREGOR remarked, that the more this question was discussed the more he felt embarrassed with regard to it. He thought this was a good movement prematurely brought forward. It had been urged that this movement would operate as an incentive to other societies to follow the same course, but he hoped they would first follow the example of this Society by subscribing handsomely to the national monument.

Rev. J. G. C. FUSSELL thought the form in which the resolution was now put got rid of all practical difficulty, as the choice of time for action would be left entirely in the hands of the Council, who would of course take care that it was timed so as not to interfere with the progress of the national testimonial, and that was all they required.

Mr. JOSEPH PAYNE, as one of the oldest members of the Society, and as having, during the first eight years of his Royal Highness's presidency, filled an office which enabled him, in conjunction with Mr. Scott Russell and others, to see a great deal of the attachment of the Prince to the Society and his exertions on its behalf, was most anxious that there should not be even the semblance of a difference of opinion on this subject. He had heard it suggested that they should institute a gold medal, to be called the Albert medal, as a reward to persons for ingenious and useful inventions connected with those matters which the Prince had so much at heart. Having referred to some well-known instances in which His Royal Highness interested himself in improving the character and taste of the manufactures of useful articles, Mr. Payne added that some apprehension had been expressed that they might set an example of multiplying memorials to the late Prince so as to detract from the national memorial, but he thought they could not object to such a tribute to his memory in that Society, where his Royal Highness was endeared to them by his intimate personal connection with their proceedings.

Mr. HENRY COLE, C.B., said, in his judgment this movement was extremely inopportune, and he had felt throughout in great difficulty as to the vote he ought to give on this occasion; but taking all the circumstances into consideration, and seeing that a modification of the resolution had been assented to, leaving the fitting time to the discretion of the Council, he was inclined to give his support to it.

After a few words from Mr. NICHOLAY, expressive of his approval of a Special Memorial on the part of this Society,

The CHAIRMAN put the resolution in its combined form, and declared the same to be unanimously adopted.

The CHAIRMAN said before the meeting separated, he wished to state, on the part of the Council, that they cheerfully assented to the duty that had been cast upon them. They would undertake it in the spirit of the resolution, that they were to be the judges of the fitting time for carrying out the matter. He would only add that the Council desired, equally with the members of the Society at large, to do all honour to his Royal Highness, their late president; the only doubt they had was as to the question of time. They never doubted the propriety of having a memorial, but they strongly felt that this was not the right moment for bringing forward the question.

Upon the motion of Mr. Alderman SALOMONS, a vote of thanks was passed to Sir Thomas Phillips for his able conduct in the chair.

FIFTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 26TH, 1862.

The Fifteenth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 26th inst., the Right Hon. C. B. Adderley, M.P., in the chair.

The following candidates were proposed for election as members of the Society:—

Baiss, James	{ 102, Leadenhall-street, E.C., & The Firs, Breachley, Kent.
Cheetham, John.....	{ Staley-bridge, Lancashire.
Child, William Henry ...	{ 21, Providence-row, Finsbury, E.C.
Clayton, Richard Clayton	{ 22, Norfolk-crescent, W., and
Brown	{ Athenæum Club, S.W., and
Edwardes, Grant	{ Adlington-hall, Chorley, Lancashire.
Reed, Thomas	{ Ledbury-road, W.
Ross, Augustus	{ Downham Market, Norfolk
Seymour, Hugh H.....	{ Glycena-lodge, Lavender-hill, S.W.
Unwin, George	{ 30, Upper Brook-street, W.
	{ 31, Bucklersbury, E.C.

AND AS HONORARY CORRESPONDING MEMBER.	
Fournier, Charles	{ Bureau du Ministre de la Guerre, Paris.

The following candidates were balloted for and duly elected members of the Society:—

Adam, John	{ 11, Pudding-lane, E.C.
Cooper, Sir Daniel.....	{ 20, Prince's-gardens, W.
Darvill, Henry	{ Windsor.
Dodgson, Wm. Oliver ...	{ 26, Royal Exchange, E.C., & Woodford, Essex. N.E.
Ferrabee, Henry	{ 75, High Holborn, W.C.
Fitche, Lewis, F.S.A. ...	{ Thorpe-hall, Elkington, near Louth, Lincolnshire.
Latham, John	{ 27, Pall-mall, S.W.
Mallett, Henry	{ Nottingham.
Nash, Edwin	{ 5, Adelaide-place, London-bridge, E.C.
Phelps, Charles	{ 18, Montague-place, Russell-square, W.C.
Porter, Wm. P.	{ 15, Finsbury-place South, E.C.
Rogers, Francis	{ 2, Arundel-place, Barnsbury-park West, N.
Russell, Thomas	{ 18, Cheapside, E.C.
Sargood, F. J.	{ 76, Coleman-street, E.C.
Sewell, Charles Brodie, M.D.	{ 76, Guildford-street, Russell-square, W.C.
Summerlin, Thos. Hopkins	{ 13, Clifford's-inn, E.C.
Thompson, James	{ Kinburn-house, Lower Tulse-hill, S.

Williams, Walter	{ 137, Fenchurch-street, E.C., & Penton-house, Newington, S.
Wood, Chas. Wm.	{ Southfields, Wandsworth, S.W.
Yapp, G. W.	{ 37, Arundel-street, Strand, W.C., and Hereford-lodge, Old Brompton, S.W.

The following Institution has been received into Union since the last announcement:—

Cardiff Young Men's Christian Association and Literary Institution.

The Paper read was—

OUR COLONIES: THEIR COMMERCE AND THEIR COST.

By HENRY ASHWORTH.

The formation of Colonies, or the migration of the human race from overstocked or unfertile regions to uninhabited but fruitful ones, is one of the oldest events either recorded in history or handed down to us by tradition from the remotest ages of the world.

Going back only to the days of Phœnicia and Greece, two maritime states, which possessed but a scanty territory, we find that emigration followed as a natural result of the increase of the population. And England, though among the latest of the European nations to plant settlements abroad, has, by her system of colonisation, and by the conquest of settlements of other nations, now acquired a more extensive colonial dominion than any other country. The success of British colonisation may in a great measure undoubtedly be traced to the natural character of the Englishman. Born and bred in an ungenial clime, accustomed from his youth to struggle against nature, he acquires a habit of perseverance and endurance that peculiarly fits him for commencing life in a new country, where for a time great hardships have to be endured. But our purpose this evening is not to trace the development of our colonies nor the cause of their progress as compared with the colonial systems of other countries, it is rather to place before the members of this Society a statement of what is their present condition—the extent of our commercial dealings with them—and their cost to the parent State.

The Colonial Empire of Great Britain is supposed now to contain more than five million square miles, taking the figures of Mr. Montgomery Martin.

There are at present 49 colonies, namely:—8 North American, 17 West Indian, 10 African and Mediterranean, 5 Eastern Asiatic, 7 Australasian, and 2 miscellaneous.

The population of these colonies is over nine millions, about five millions of whom are of European race.

The colonies in charge of the Colonial Secretary may be divided into three classes:—1st. Those having a Representative Assembly or Legislative Council nominated, and a Governor appointed by the Crown, such as Trinidad and other West Indian Islands. 2nd. Those having no Representative Assembly, but a Legislative Council and Governor. In some colonies of this class the members of the Legislative Council are partly nominated by the Crown and partly elected by the colonists, as in British North America. 3rd. Those having neither an Assembly nor Council, but only a Governor, such as Gibraltar. In many instances there is also an Elective Council, composed of the principal officials of the Crown.

Excluding from consideration British India, and confining ourselves to those outlying possessions of the Crown which are under the jurisdiction of the Colonial Office, we will proceed to pass under review the wide-spread extent of our colonial dependencies, the enormous armed force required for their defence, the civil, judicial, ecclesiastical, and other establishments, and the extraordinary amount of expenditure involved in the upholding of our authority

in them. All or most of this expense is considered to be necessary and is annually granted by Parliament, and incurred for the ostensible purpose of fostering and protecting our commerce.

In proceeding to an investigation, not of the principles, for there seems to be no settled principle, but of the arrangements, upon which our Colonial Policy is based, it will be our endeavour to ascertain whether the existing system may not be so amended as to ensure a more economical and altogether better Government; and that, too, without detriment to the interests of the mother country, or in any way impairing the resources of the colonies, or disturbing the loyalty and attachment of the inhabitants to the British Crown.

The advantages which may reasonably be expected to result from our colonies to Great Britain, appear to be, the extension of the manufactures and the trade of the mother country by the demand for home products in the colonies; the consequent impulse given to industry at home, and the opportunities to industrious labourers to emigrate to countries where land is cheap and wages higher.

If a colony does not accomplish these objects, but becomes a source of expense to the mother country, or if the colonists should, by regulations and restrictions, choose to embarrass the trade between the mother country and them, then in such cases the parental design has been frustrated, and the relations on which the settlement has been based no longer exist in healthy action.

Our colonial possessions place a large amount of patronage at the disposal of the home and local governments, and are therefore looked upon as profitable to those who participate in the benefits of posts and places in them, especially in the various branches of the army, navy, and civil service, as we shall presently have occasion to show. The British taxpayer, who is chiefly called upon to provide for these expenses, has a claim to receive some proof of solid advantage,—some evidence that the protection afforded to British shipping and British commerce by our colonial posts, has been equivalent to the expense incurred for their maintenance.

In the following table will be found a brief abstract of the general statistics relative to the colonies, thrown into groups according to their geographical position:—

TABLE No. 1.

ABSTRACT OF THE RETURNS OF POPULATION, REVENUE, DEBT, IMPERIAL EXPENSE OF GOVERNMENT, AND FOREIGN COMMERCE OF THE VARIOUS GROUPS OF DEPENDENCIES OF THE BRITISH EMPIRE, CHIEFLY FOR THE YEAR 1859.

COLONIES.	Population according to last returns.	Revenue.	Debt.	Imperial Troops employed.	Imperial Cost of Government.	Imports from Great Britain.	Imports from other countries.	Exports.
EASTERN—Including Ceylon, Mauritius, Seychelles, Straits Settlements, Hong-Kong, and Labuan	2,675,536	£ 1,558,831	£ None.	£ 4,707	£ 510,340	£ 1,524,640	£ 4,421,392	£ 12,498,758
AUSTRALASIAN—Victoria, New South Wales, Queensland, South Australia, Western Australia, Tasmania, and New Zealand...	1,223,985	6,267,626	12,175,460	3,121	423,465	15,256,354	11,311,337	21,982,286
AFRICAN SETTLEMENTS—Sierra Leone, Gambia, Gold Coast, St. Helena, Cape Colony, British Kaffraria, and Natal ...	629,013	777,883	1,033,711	5,862	870,695	2,260,745	999,085	2,629,439
MEDITERRANEAN POSSESSIONS, &c.—Gibraltar, Malta, Ionian Islands, Aden, Heligoland, Falkland Islands	400,865	317,804	300,000	16,984	1,073,578	404,839	3,344,263	2,477,040
NORTH AMERICAN COLONIES.—Canada, Nova Scotia, New Brunswick, Prince Edward's Island, Newfoundland, Canada, Vancouver, British Columbia	3,210,779	2,475,626	12,298,501	4,690	580,404	4,724,066	7,027,719	10,907,493
WEST INDIAN POSSESSIONS.—British Honduras, British Guiana, Jamaica, Bahamas, Turk's Island, Trinidad, Barbados, Grenada, Tobago, St. Vincent, St. Lucia, Antigua, Montserrat, St. Kitts, Nevis, Virgin Islands, Dominica	986,035	1,046,618	1,676,626	4,578	657,276	2,408,951	2,702,873	5,788,803
	9,126,213	12,444,388	27,484,298	39,942	4,115,758	26,579,695	29,806,699	56,283,819

The returns relating to the entire expense of our colonies falling upon the British exchequer during the five years from 1853 to 1857 inclusive, (being the last we have seen published), are:—Cost of the several colonies to the Imperial Government for 1853, £3,845,018; 1854, £4,466,201; 1855, £4,804,956; 1856, £4,877,957; 1857, £4,115,757. Average of the five years, £4,421,977.

In order that the nature and extent of this expenditure may be more fully comprehended we would now draw attention to the Return ordered upon the motion of Colonel Sykes, dated April 19, 1859.

In Table No. 2 (next page) there have been embodied the expenses of every kind which have been incurred on account of the colonies, excepting naval charges and some Post Office expenditure which cannot be apportioned.

We will next take the latest estimate of the military expenditure for the colonies, as shewn in a Parliamentary

return just issued, which gives the strength and cost of troops in the British Colonies for the year 1858. It does not include the Mediterranean stations, the Ionian Islands, nor Hong-Kong:—

	No. of Troops.	Imp. Military Exp.
British North America	1858. 5,523	1858. 332,555
Cape Colony	6,351	473,392
Australia and New Zealand	3,198	216,114
West Indies	5,021	323,305
West Coast of Africa.....	1,030	58,287
Eastern Colonies.....	3,569	180,124
Miscellaneous	1,760	97,283
Total.....	26,452	£1,681,060

The numbers are taken from Appendix, No. 13, of the report of the Committee of the House of Commons on Colonial Military Expenditure, dated the 11th of July, 1861. Hong-Kong was omitted, by direction of the Committee, from the returns from which the present one is compiled, because the Colony was in 1858 the rendezvous of the army engaged in the China war, and its proper garrison could not be distinguished.

We are taxed about £1 per head in this country for the expense of the army and navy; the same rate in the colonies would give £8,148,641. But it is seen above that the cost of the Queen's troops employed is only £1,681,060, so that the colonists, if they met all their own disbursements, would not have to pay more than 4s. per head, an amount that could not be deemed excessive.

The Commercial importance of each of our colonies may be estimated from the following return, showing the declared value of the exports of British produce and manufactures to our colonial possessions in each of the last two years:—

	1860. £	1861. £
Australia	9,707,261	10,701,752
British North America ...	3,727,350	3,696,646
Cape of Good Hope and Natal	2,065,523	1,986,629
British West Indies	1,845,254	1,850,001
Hong-Kong	2,445,991	1,733,967
Singapore	1,671,092	1,026,018
Gibraltar	1,159,313	1,016,092
Channel Islands	655,948	666,325
British Guiana	571,685	613,973
Malta and Gozo	704,073	564,161
Mauritius	538,303	551,797
Ceylon	671,219	485,659
British West Coast of Africa	340,366	381,163
Ionian Islands	345,055	296,603
British Honduras	142,554	201,135
St. Helena	46,405	45,466
Aden	45,297	12,369
Falkland Islands	5,306	9,847
Ascension	8,688	7,644
Labuan	2,583	1,217
Heligoland	287	386

£26,699,543 £25,848,880

It will be observed that there is a decrease of nearly one million sterling in the amount of our exports last year.

Our military garrisons, naval stations, convict depôts, and other dependencies maintained chiefly for objects of Imperial policy, are, Malta, Gibraltar, the Ionian Islands, Hong-Kong, St. Helena, Bermuda, Bahamas, Heligoland, Falkland Islands, Western Australia, Labuan, the West African settlements of Sierra Leone, Gambia, and the Gold Coast.

The number of Imperial troops on these stations, as reported by the "Select Committee of 1861 on Colonial Military Expenditure," was 20,910, and the expenditure on military account was £1,509,835. To this has to be added other undefined sums, for naval expenditure, packet service, conveyance of troops, civil, judicial, and ecclesiastical services.

The estimate of expenditure for fortifications and other works now in progress, (in addition to the sums in the estimates for 1861-2,) which are deemed necessary to render the above places in a state of reasonable defence, would, according to the evidence of Sir John F. Burgoyne, amount to the sum of £1,000,000.

The dependencies just enumerated are held as the outposts of the British Empire, and are deemed of importance in periods of war. Nearly the whole of them are, however, far removed from the centre of the Empire, and according to the evidence adduced before that Committee, they are likely to become sources of weakness, and not of strength, by causing our forces to be scattered and not concentrated. The outlay already incurred in

TABLE No. 2.

A RETURN OF THE COST OF THE SEVERAL COLONIES OF THE BRITISH EMPIRE, AT THE EXPENSE OF THE BRITISH EXCHEQUER, FOR 1857.

	£
MILITARY AND MARITIME STATIONS.	
Gibraltar	423,589
Malta	442,722
Cape of Good Hope	682,015
Mauritius	74,881
Bermuda	158,061
St. Helena	62,640
Heligoland	1,274
Ionian Islands	199,470
Falkland Islands	6,523
Hong-Hong	303,735
PLANTATIONS AND SETTLEMENTS.	
Jamaica... ..	193,711
Bahamas	52,045
Honduras	33,802
West Indies	305,981
Canada	236,484
Nova Scotia	154,605
New Brunswick	9,430
Prince Edward's Island	1,500
Newfoundland	20,114
Vancouver's Island	210
West Coast of Africa	126,039
Ceylon	119,279
Labuan	12,445
AUSTRALASIAN SETTLEMENTS.	
North Australia	5,666
Western Australia	94,769
South Australia	9,940
Victoria... ..	44,113
New South Wales	59,646
Tasmania	96,936
New Zealand	112,395
Sundry Colonies	71,737
	£4,115,737

the fortifications of those places has been almost incredible, although it appears that in their present condition they require this additional expense of one million for complete defence. They are garrisoned, in time of peace, at the enormous cost already shown, and, with the improved knowledge of artillery, it is doubtful whether they could resist an attack; and we have it on high authority that in time of war it is not improbable that they would have to be abandoned.

Let us now examine some few of these individual colonies and outlying posts, and see what is the expenditure they entail on the mother country:—

When the IONIAN ISLANDS fell into the hands of the British for protection, it was an express condition that some portion of their military expenditure should be borne by the States themselves, and by way of contribution a sum was appointed to be annually paid by them. These payments have been allowed to fall considerably into arrear, and a large sum remains, and, no doubt, ever will remain, unpaid. The expense of their continued protection, conducted on a very enlarged scale, is, nevertheless, voted year by year by Parliament, and according to the last return we find that our military expense on them has ranged from £150,000 to £280,061, and according to the estimate of Sir John F. Burgoyne, the sum required to place Corfu in a proper state of defence, is £75,000. The value of our exports to these islands, in 1861, was £296,603, being a little over the expense incurred for our troops.

Mr. Gladstone, in his evidence before the Committee, stated that Corfu and the Ionian Islands generally, in the event of a war, instead of being a military advantage to us, would be a military burden of such a nature as

we might, perhaps, find almost intolerable, adding, "I think when a good opportunity arises of divesting ourselves of that obligation it would be very desirable, but I do not see at present any likelihood of such an opportunity."

The **BERMUDAS** are chiefly a mass of worthless rocks, which have been garrisoned and fortified chiefly with a view to possible hostilities with the United States. We have there a garrison of 1,128 men, the military cost has been put down at £82,000 to £87,587, and the estimate of Sir John F. Burgoyne, as necessary for new works to put the place in a state of proper defence, is £150,000.

ST. HELENA enjoys a notoriety as the residence enforced upon Napoleon Bonaparte. The annual military charge now incurred upon that island is £55,000, besides other expenses, and the estimate for fortifications, deemed requisite by Sir J. Burgoyne, amounts to £25,000.

The Imperial expenditure on **WESTERN AUSTRALIA** in the last seven years has exceeded £750,000. It is now maintained principally as a penal settlement, as all the other Australian Colonies have refused to receive convicts.

HONG-KONG has cost the mother country a heavy sum of money, and the vote for military expenditure there and in China this year is unusually large, being £278,077.

Our other eastern possession of **LABUAN**, involves an expenditure of several thousand pounds a year, with no commensurate advantage.

On that desolate and isolated dependency, the **FALKLAND ISLANDS**, with a population of but 500 souls, we have, for years past, expended in various ways, £5,000 or £6,000 a year, and the annual military cost is put down at £2,177.

MAURITIUS is well able to pay its own military expenditure, instead of being a charge of £135,000 to the Imperial Treasury. Our object in taking it was to prevent its falling into the hands of France.

Looking at the progress **Ceylon** has made in wealth and commerce, that island is also well able to bear all its own charges without any longer saddling upon Great Britain the cost of from £90,000 to £100,000 annually for military expenditure.

There are 4,866 troops stationed in the **CAPE COLONY** and in British **Kaffraria**, and the military charges for these on the average of the two past years is £417,278. The several Kaffir wars in South Africa have entailed a very heavy expenditure on the British people,—at least £500,000 per annum for some years past;—and there is no doubt that, had the colonists to bear these charges themselves, they would be more considerate in their conduct towards the natives, instead of looking, as they now do, to a frontier war as beneficial to themselves from the large Imperial military expenditure which it entails.

As regards the administration of justice in the colonies, a return, moved for in June, 1858, by Mr. Warren (No. 239, Session 1859), gives the names, salaries, and duties of the judicial officers of most of them, but this return is incomplete, as the amount of many of the salaries is not stated.

Taking the **WEST INDIES** as a case in exemplification, we find that 175 officers in these colonies received among them salaries amounting to £93,140. These salaries ranged from £50 to £2,500 each per annum. This remuneration was exclusive of those officials who were paid by fees, and many officers were also in the receipt of other salaries.

We now come to consider the colonies which have been designated "Colonies Proper," being those from which the commercial return has been held as a consideration.

In the **West Indies** it was not unreasonable to expect that in the quarter of a century which has elapsed since the abolition of slavery, for which the mother country so freely paid the sum of 20 millions sterling, there would have been a restoration to prosperity quite sufficient to enable the colonists to conduct their own affairs with ordinary discretion, and without any further pecuniary aid from the British people. We find, however, that the rate of

Imperial expenditure has not been reduced to the extent anticipated.

The number of Imperial troops now stationed in the **West Indies** is 4,180; the imperial military expenditure, £362,699; the judicial expenditure, £93,140; the ecclesiastical, £19,444; the naval fleet on the **North American** and **West Indian** stations is very large; and the mail packet service costs us £238,500.

The outstanding loans are as follows:—

Jamaica owes the Imperial Treasury about	£500,000
British Guiana	320,000
Trinidad	140,000

The declared value of our exports to the **West Indian** colonies in 1861 was £1,850,000.

Any advantage to be derived from the possession of the **West Indian** colonies for purposes of European emigration is entirely out of the question, seeing that the climate is altogether unattractive or unsuited to our race. As negro islands they may subsist, but so long as they are permitted to remain as British colonies they will continue to be a regular drain upon the pockets of the people of England, without any compensating advantage in a commercial point of view. It is acknowledged that the troops we have provided and stationed in these islands are not at all needed for purposes of defence against any outward attack, but are retained for the mere purposes of police, in suppressing those cases of internal commotion which frequently arise. It may be proper to remark that as these colonies cannot be made to prosper, even at so enormous a cost, it becomes a consideration of prudence and economy how we shall deal with the claims they may have upon us.

We will next proceed to a consideration of the **Australasian Colonies**, including **New Zealand**.

The number of British troops employed is 2,947. The Imperial military expenditure has reached about £49,000, and **Western Australia**, which is a convict settlement, costs us from £20,000 to £26,000 for troops.

At the 75th anniversary of the establishment of the **Australian Colonies**, held on the 12th February last, His Grace the Duke of Newcastle, Secretary of State for the Colonies, expressed his congratulations upon the successful foundation of so powerful, happy, and prosperous a community, having a population of 1,250,000, and a revenue of £6,500,000. He stated that their imports now amounted to £25,000,000, of which no less than £16,000,000 came from the mother country. The exports of these colonies were valued at £21,000,000, and within the last ten years they had raised and exported more than £100,000,000 in value of gold, principally to this country. The export of wool had also reached a value of £2,000,000 annually, all of which afforded material evidences of prosperity. The laws they had framed had been after the example of England, and, by way of conclusion, he added, "if they thought their strength was sufficient to allow them to stand alone, we should not seek to restrain them by force." Referring to the distinguished men identified with the rising prosperity of the **Australian Colonies**, who honoured this anniversary with their presence, and bearing in mind the significant remark of the Duke of Newcastle respecting their capability of self-government, it will be interesting to ascertain, on some future occasion, whether they wish to set up for themselves in a state of independence or desire to remain under their allegiance to the British Crown.

We may also adduce the cheering proofs we have before us of prosperity and enterprise embodied in the following account of the expenditure for public works in these colonies. In the last ten years there has been expended there on—

Railways	£8,000,000
Telegraphs	163,476
Roads and bridges	5,272,620
Other public works	3,500,000
	<hr/> £16,936,026

The imports into Victoria in 1860 amounted to £15,093,730, being nearly £28 per head.

With such evidences of material prosperity before us, it may reasonably be inquired why do not these colonists, so high-minded as they showed themselves at this anniversary, pay their own expenses of military defence? The reply is one which will be found exceptional, and, as far as it goes, favourable. In the year 1851 the Australian colonists entered into an arrangement with Earl Grey, at that time Secretary of State for the Colonies, that they should be allowed by the mother country a certain number of Imperial troops, and if they required more they agreed to pay for them. This arrangement has continued in force, and has worked well throughout.

The tendency of import duties levied on manufactured articles has usually been found to generate a desire for native manufactures, and it would appear that Victoria, abounding to so remarkable an extent in natural resources, is by no means an exception to this rule, for example:—Mr. Mayes, the successful writer of a prize essay, reminds the colonists that in the year 1858 they had imported woollen goods of the value of £528,000, and in the same year had exported wool of the value of £1,678,290; showing that whilst they possess the raw material in such abundance, it was important that they should endeavour to manufacture some of these imported goods, and he proceeds at once to furnish an outline of the processes which are necessary to convert wool into woollens. The colony of Tasmania is also, on the same principle, endeavouring to establish native manufactures.

The increase of Colonial expenditure in Australia is also deserving of notice. In the oldest colony, New South Wales, the expenditure in 1851, when the population was 197,168 souls, and Port Phillip had just been separated from it, was only £444,108. In 1854, with 251,315 souls, it was £1,136,569. In 1860, with 348,546 souls, it had increased to £2,047,955, although in the close of that year Queensland had been separated from it, and formed into an independent colony. New South Wales has debentures issued for loans to the amount of £3,019,730.

The expenditure on the part of the Imperial Government on military and naval protection for New South Wales was, in the year 1860, £39,264; in 1861, £43,000. A larger amount of revenue ought to be raised from land funds, from well-considered Customs duties, gold licenses, and export duty, and applied to meet the legitimate expenditure, but it is evident that there is in the Australian colonies too strong a tendency to go ahead in expenditure upon public works, public buildings, and other improvements, on a grand scale, out of money obtained upon credit, and on the strength of loans raised in the mother country. Thus, even the small colony of South Australia has spent one million and three quarters sterling on public works in the last ten years, and yet it is a charge of £9,000 or £10,000 annually to the parent State.

Let us now turn to the NORTH AMERICAN COLONIES.

The Imperial military force employed in these colonies before the late disturbed state of America, was 4,690 men.

The Imperial military expense is ...	£413,566
Indian department ...	3,755
Civil services ...	2,000
Ecclesiastical ...	7,474
Packet service ...	14,700
Naval service ...	44,951

Since the peace of 1815, it has been ascertained, with a considerable degree of certainty, that in preserving these possessions our ordinary military expenditure, including stores and supplies of the garrisons, has amounted to half a million a year.

The estimate of expense of fortifications required at Halifax, Nova Scotia, according to the evidence of Sir J. F. Burgoyne, is £75,000. The votes for the present year for military expenditure in Canada and the Lower British American Provinces have been swelled to £1,000,000.

These expenses of conducting the government and military defence of the North American colonies, large as they may appear, form only a portion of the cost which has been incurred in securing and sustaining their efficiency as entrepôts of commerce. In Canada there has been expended an enormous amount of British capital in the construction of works of internal navigation and stupendous lines of railway, which of themselves have hitherto yielded a very insignificant return upon the outlay.

Our colonial policy as exemplified in Canada urgently demands our most thoughtful study and attention. The territorial resources of the country are said to be unbounded. The people settled in those colonies are, for the most part, our own people. The loyalty and attachment of the colonists to the British rule may be said to have prevailed in greater or less extent throughout the period of our authority, although at times it has assumed a questionable character not unminged with slight tracings of a political coquetting with the United States. Indications of incipient revolt have sometimes appeared, leading to the granting of constitutional concessions and other indulgences, which they manifested a craving to obtain. Favour has been shown at our custom houses to the products of Canada imported into this country. The timber of their forests, although of an inferior quality, has been admitted at a differential duty. The like advantage, by way of bounty, has been given to Canadian built ships brought to this country for sale, and upon these ships there has been allowed a drawback or exemption from duty upon the materials used in their construction and equipment. It was provided by the act of 1791 that one-seventh of the ungranted lands of the colony should be set apart for the support of a Protestant clergy. In the year 1850, in consequence of the discontent which arose, the House of Assembly requested permission to dispose of the remainder of these lands after the existing stipends were commuted, and her Majesty was advised to comply with the request. The importance of this grant, and the value of the lands which were surrendered to the colonists, may be estimated by the sales which have been made of some portions of them in the year 1859. The sum of £45,280 was realised from the sale of 90,729 acres, and this amount was appropriated amongst the various municipalities. It may not be out of place to introduce the remark, since it has a bearing on the subject, that in the Canadian House of Assembly a resolution was passed by a majority of nearly ten to one, that the religion of the Church of England, as by law established, was not the religion of the majority of the inhabitants of the colony.

This minority of the people, which to some extent only might be said to represent the Protestants of the colony, finding themselves bereft of the pecuniary resources which had been provided for their own exclusive wants, and being deficient in public spirit to defray at their own expence the attendant charges of their religion, have succeeded in obtaining from the mother country ecclesiastical appointments, with the usual provision of salaries and stipends, amounting in the years 1858 to £7,397, 1859 to £8,766, 1860 to £5,560. The above aid is in some extent terminable as the lives of the parties drop off.

It will be admitted that this nursing and out-door relief administered to the colonies has been unsparing, and if it cannot be openly defended, it may, to some extent, be accounted for as arising out of a somewhat popular impression that colonies may be created and maintained;—that a lasting benefit may be derived from their existence both for the mother country and for the new communities she establishes;—and that, as a consequence, if we regulate our conduct in a spirit of true liberality towards them, they, in turn, will deal generously and in a spirit of friend, ship with us. But from the evidence we have before us this liberality on the part of the mother country has not met with so generous a response on the part of the colonies as we had reason to have expected.

In a country bordering so closely upon the United

States, it has been our policy to concede to our fellow-subjects in Canada political institutions of unsparing liberality, but which, in their application, have been found unmanageable. It is true that we have held in reservation the power of veto to be exercised in cases of colonial policy, but this is a relic of royal authority which we have very sparingly used. The Legislative Assembly has been entrusted with very great powers, and out of its proceedings evidence may be supplied of the most unaccountable freaks of policy ever heard of. In the period which has elapsed since the provinces of Upper and Lower Canada were united, the public debt has been increased from one million to fifteen millions sterling, meanwhile the expenditure of this money has been lavished in every description of loans and advances on colonial credit, made to the municipalities and for public works. The members of the House of Assembly being returned by the municipalities, give their support to the ministry on condition of the advance of some loan to their constituents for a speculative object of local improvement. The loan is sanctioned out of money which has been raised under public guarantee. It thus happens, not unrequitely, that the money so easily obtained is wasted or applied to an unprofitable purpose. The inhabitants cannot or will not pay the rates imposed to defray the interest, and the public treasury is hence called upon on the guarantee. This has been the case principally in Upper Canada. When the French colonists in Lower Canada complain of such an unequal appropriation of the public money, they are quieted by a compensation out of the public purse paid to their landlords for the commutation of the trifling rents payable on their land.

Some of these municipalities are said to have borrowed larger sums than the whole of the property within their boundaries would sell for. The following extract, confirmatory of reckless borrowing, is from the *Toronto Globe* of January 31st, 1862:—"It has come to be considered that a debt to the province is no debt at all; that no obligation to the Government is binding on those who have political influence at command. A majority of the municipalities which borrowed under the Loan Fund Act, have not made the slightest exertion to pay their indebtedness, but have left the government in the lurch without shame or compunction." As the province has guaranteed these municipal bonds, their holders will, of course, be protected but we find that the Provincial Parliament has granted to some of the municipalities the power to hypothecate and to levy rates to pay the bond-holders.

The municipal authorities of the town of Hamilton, with about 10,000 inhabitants, having obtained this power, appear to have concluded that there was no necessary limit to the extent of their borrowing, and they have succeeded in raising loans to the amount of £460,000. This debt has been found so heavy that they have become unable or unwilling to pay the interest. The bond-holders refuse to relax the hold they have got, and are loud in their complaints of "confiscation and repudiation." The municipality, being in this unpleasant condition, is now appealing to the Provincial Parliament for aid, upon the ground that, having given them these large powers, they are implicated. Such disclosures do not give us a favourable estimate of Canadian public morality, and it will be important to consider what may be the result of corruption in the constituencies, corruption in the representatives, and no immediate check between the demands of the constituencies and the public exchequer.

It may be inquired, is there no control? Has the Governor no veto on loans? Apparently none whatever. He is named during pleasure, and is the instrument of any ministry whom a majority of this one assembly may impose upon him, and no doubt an address for his removal would follow any disobedience of their orders. It must be so, since he has submitted, without the least attempt to arrest it, to the constant increase of the tariff on British manufactures and trade, even to the imposition of highly protective duties, well knowing that this was in direct opposition to the national policy.

We find in the evidence of the Duke of Newcastle that, seven or eight years since, the projectors of a railway from Halifax to Quebec had laid before the Colonial Secretary of that day their estimates of the expense. He took some pains to investigate the subject, but never imagined that it was likely to be a paying line, though, under existing circumstances, he did not think that remuneration ought to be the sole consideration, but he added, if you are going upon any other principle, the question is—Who is to find the money? The scheme, we perceive, is now revived, and recourse is about to be had to our capitalist class.

Let it not be supposed it is from any unfriendly feeling that in this place we remark upon the proceedings of the Legislative Assembly of Canada, on the only occasion we ever visited the House. Without drawing from memory, we will have recourse to the published reports of the following day, the 5th June, 1857, in the *Globe* newspaper, of Toronto.

"THE SOUTHERN RAILWAY BILL OF MR. RANKIN.—The purport of the Bill was the renewal of a charter which had been granted for the construction of a railway in the year 1854, and although the contracts had been given out, the Bill had been allowed to lapse. The ratepayers of three townships and two villages had been induced to lend their credit for £145,000, and a portion of the road had been constructed.

"Mr. Freeman said—Under the amalgamated scheme, it would be impossible to induce any body of intelligent capitalists to take stock. It could only be done by concealing from them the fact that, out of their money, £25,000 would go into the pocket of one person as a bribe for services of a questionable character, and £15,000 into the pockets of three persons for doing that which, to say the least, was dishonest and disreputable. It could only be done by concealing from them also the fact that, out of the £145,000 subscribed by the municipalities, there was only work to be shown which had cost £32,000, but the real value of which now, from its having been allowed to go to decay, was not half that sum.

"Mr. Wilson said—The hon. gentleman in charge of the Bill had entered into a contract whereby, for services in obtaining the contract for Mr. Zimmerman, he was to receive £12,000 at once, and £13,000 after the completion of the road."

Amidst proceedings like these, it may be remarked—Would the capitalists, or the Ministers of the Crown of any nation but the British, allow of so large an amount of successful practice upon their credulity? Moreover, we have a manufacturers' as well as a capitalists' interest, which it becomes the imperative duty of the mother country not to overlook.

We have already stated that the public debt of Canada has increased from one to fifteen millions sterling, and we may further observe that along with this continued borrowing, the Canadians have gone on increasing year by year the taxes on our manufactured imports to pay ourselves the interest. The rates of Custom-duties levied upon imports range from 10 to 100 per cent.; and, with in the last twelve years there have been no fewer than seven changes of the tariff, increasing the duty upon British manufactures variously from 10 per cent. to 20 and 25 per cent.

The tariffs of many of our principal colonies have been remarked upon as being more unfavourable to British commerce than those of most foreign countries. During the negotiations on the French Treaty, the protectionists of France expressed their surprise, that the English should demand of them a lower scale of duties than they themselves allowed to be imposed on British manufactures imported into their own colonies. The effect in Canada of such a policy must, in the end, be suicidal to her commerce, by the restriction thus imposed on consumption; indeed, this has already been disclosed in their commercial returns, showing, that while the average of the colonial trade of Canada for the five years ending with 1857 was £4,800,000, the average of

the four years ending with 1861 was only £3,700,000—being a decline of 23 per cent., notwithstanding the increase of population and the great improvement in the condition of the country.

One of the important pecuniary advantages ever present to the mind of the emigrant is that of his being entitled to enjoy in our colonies the privilege of an inhabitant of the mother country, in his exemption from those fiscal burdens imposed for purposes of "protection;" in this respect he finds himself disappointed.

It may be asserted that the object of these high duties is not protection—but revenue. It cannot, however, be concealed that protection formed some portion of the object of the Legislature. There are admissions to that effect, and, under the encouragement afforded by these high duties, corporations and companies are in course of formation to establish local manufactures. The following extract, from the "Annual Review of the Trade of Toronto, for 1861," most fully confirms this view of the subject:—"The trade in home-manufactured woollens has been large and very successful." The writer proceeds to enumerate about a dozen of those manufacturing firms who have established "first-rate mills in the province," and congratulates the public on the enterprise embarked in the cotton manufacture; although regretting that it is now unhappily being held in suspense for want of cotton, owing to the American rebellion.

Having indicated the bearing of the policy which, as a mother country, we have adopted towards our colonies, and having more particularly brought under observation what has been the character of the return we have received from our Canadian fellow subjects, it now becomes the duty of our countrymen to consider the future of our proceedings, and to make selection of that course of policy which may be deemed most pregnant with successful results, both to our fellow-subjects in the colonies and to ourselves.

More than one of the most enlightened of our statesmen have laid down what they have conceived to be the most salutary means whereby to establish a community, and to prepare them to enjoy independence and freedom.

Mr. Gladstone, in his evidence before the Committee on Colonial Military Expenditure, observed:—"No community which is not permanently charged with its own defence is really a community. The privileges of freedom and the burdens of freedom are absolutely associated together; to bear the burdens is as necessary as to enjoy the privilege, in order to form that character which is the great ornament of freedom itself."

Mr. J. S. Mill says:—"In proportion as a man has more or less to do for his country he becomes attached more or less as a free citizen to it." We may also refer to the generally understood remark that colonies have been considered as young nations educating themselves.

Hitherto, as we have shown, the Canadians have been exonerated from the necessary training for this preliminary duty; they have been excused from this bearing of burdens, and the effects are now apparent, showing as they do that such a policy is not only unsound but enervating. It is true that they sought for and obtained self-government to enable them freely to direct their own affairs. This concession, whether they know it or not, involves the idea of self-sufficiency, and the attendant responsibilities, but how humiliating do we find the moral! Reviewing our past policy in regard to our North American Colonies, it will be admitted that our possession of them has exposed us constantly to some difficulty or other with the adjoining States. It is the weak point on which the Americans depend for their power of annoying and possibly insulting us.

The extent to which this system of colonial policy is hereafter to be carried, is at present obscure. Hitherto our countrymen have remained quiescent whilst the defensive power of the Crown, and the exercise of the veto, have continued to be held in abeyance. The dignity of the Crown, and the purse-strings of the people, are reposed in

the hands of her Majesty's advisers; the responsibility is weighty, and measured by these results, somewhat humiliating. Nothing can be more certain than that if we go on erecting fortifications and providing garrisons of soldiers as we have hitherto done, the effect will not fail to be accounted a menace to the United States, ending in war-like operations on the Canadian frontier.

It will scarcely be necessary here to remark that the North American Colonies can have no right to exercise the legislative functions we have conferred upon them in contrivances for their own supposed advantage, excluding the mother country in the manner they have done from a participation of trading benefits, and this too with the full knowledge that they are drawing year by year so largely upon Imperial funds for governmental, religious, and defensive aid. So gross a violation of natural rights and common principles is surely unexampled.

Having regard to the before-mentioned evidence, are we not called upon to determine that this expense, falling as it does upon our Exchequer, shall be seriously diminished or entirely cut off?

We have before us the Report, already alluded to, of the Select Committee on Colonial Military Expenditure of last year, and we place great reliance upon the testimony of some of the most experienced witnesses, men of high rank and official character, insisting as they do upon the entire safety, no less than the urgent necessity of throwing upon the colonists, either wholly or partially, the charge of conducting their own defences. Mr. Godley, Under-Secretary of State for War, has asserted, and most persons will admit the correctness of the assertion, "That Englishmen have never shown themselves slow in defending themselves. That the American colonists of the last century, and the Carolinians of the present time, confirm this. That no British Colony having been left to defend itself had ever been conquered, so far as he knew, and no one defended by the mother country had ever resisted a hostile expedition." Other witnesses, whose evidence will be found in that Report, considered that our maintaining troops in a colony only acts as an opiate; that the Canadians, if they were left to themselves, might neglect the forts we have erected, but they would defend the province. It was proposed that aid might be offered to their own contributions, as in the case of Australia, but they felt assured that any such proceeding as we have indicated would not involve any risk of separation, nor anything beyond loud talking.

Still more clearly defined and equally confident is the language of General Sir De Lacy Evans, M.P., in the following extract from a recently published letter:—

"The Canadas have now a population of nearly three millions; in fact, a similar numerical force with that of the thirteen United States of America, which in the last century so triumphantly repelled the fleets and armies, and cast off the yoke of England. The real security, then, of the people of British North America consists much more in their own unity of spirit, numbers, and organisation, than upon the assurance, powerful though it may be, of the mother country; and any course of proceedings on our part leading them to make other calculations, would, I venture to think, be decidedly impolitic. Canada is still, indeed, a nominal dependency of the British Crown, but it is in fact an independent government, receiving from us at present, without any just cause, above a quarter of a million sterling per annum for its ordinary military charges. She also does not hesitate to tax us to the amount of from twenty to twenty-five per cent. duty upon British manufactures imported into her territory. Surely the time has at length arrived for placing this absurd system on a more equitable basis as between the people of the colonies and those of the superior state."

It has evidently been a serious mistake in our colonial government to allow the colonists the power of regulating the policy which may make war necessary or unnecessary. Nothing is more remarkable than the frivolous causes which almost always suffice for going to war, even when

there is little or no prospect of gaining, often when there is every probability of losing, by it. If the colonists had to bear the weight of the conflict themselves, they would doubtless make a study of those arts which are promotive of peace. Possibly we may one day make the discovery that we have placed too high an estimate on colonial allegiance to the British Crown. Would this advantage be worth a single year's purchase of the outlay we expend upon the mere pretence of defending their territory? No doubt they would have regard to their own immediate interest, and perhaps might discover the wisdom, and place some reliance upon the counsel, which the Right Hon. Robert Lowe has given in his evidence,—“That the advantages the colonists gain by being part of the British empire are enormous. Now, they have the weight of England on their side;—if England were a foreign power, they might know what it was to feel the weight of England against them.”

But it is possible that one or other of our countrymen may take alarm and exclaim, “How about our commerce? What would happen to our commerce if we lost the hold we now have upon our colonies?” Let us take a deliberate view of the profit and loss account, and have recourse to sound commercial principles, before we commit ourselves in any action.

Having reference to the expenditure of 1857, which is the latest account in a complete form we have in our possession, we find the Imperial cost to have been £4,115,757, and the average of five years previously £4,421,977; but we should not forget that this amount, large as it may appear, is only some important portion of the whole sum. The colonies have shared in no inconsiderable measure in the £12,608,000 we have expended on the navy, and one million on the packet service. We have at the present time 635 vessels of war afloat, but it is impossible to determine what numbers are stationed in the Colonies, as they are continually shifting from station to station. However, amidst statements and accounts which are so crude, we need not be over-nice in making these calculations, and shall adhere to the Imperial disbursement of £4,115,757, and, leaving out the question of the undiscovered expenses relating to the navy, let us proceed to reckon upon this sum, as the amount which may be considered to fall upon British commerce, represented in the name of our commercial class; for whose benefit in so large an extent this expenditure is alleged to have been incurred.

The declared value of our exports to the colonies (exclusive of India) for the year 1861 has been £25,848,880. Consequently the above colonial charge, bearing upon the amount of our trade, has been no less than sixteen per cent. By way of illustration, the Australian colonies contribute to some considerable extent to the expenditure for military defence, and the Imperial charges have thereby become by so much lessened, when measured by our commercial transactions, that they amount only to four per cent., whilst upon our North American colonies they are ten per cent., and upon the British West Indies they are twenty-two per cent. In this manner the pressure goes on increasing in our various colonies to as high as one hundred per cent., and there are several instances in which the expense we have incurred for the Government account has greatly exceeded the value of all the shipments we have made to them of manufactures and produce of every kind.

Potent as the figures of arithmetic may be in determining a question of commerce, the delusive effect of an unsound commercial policy could not be more completely set forth than we find it in the advice of Jeremy Bentham, addressed to the National Convention of France, and headed, “Emancipate your Colonies. What should colonies be worth to you but by yielding a surplus of revenue beyond what is necessary for their own maintenance and defence? Do you, can you get any surplus from them? If you do you plunder them and violate your own principles. ‘Oh, but the produce of our colonies

is worth so many millions a year; all this, if we were to give up our colonies, we should lose.’ Illusion! The income of your colonies your income? Just as much as that of Britain is your income. Can you take a penny of that income more than they choose to give you? or should you if you could? We have no such pretension. ‘Oh, but of this income of theirs a great part centres here; it comes to buy our goods; it constitutes a great part of our trade; all this, at least, we should lose.’ Another illusion! Must you govern a people in order to sell your goods to them? Is there that people on the face of the earth who do not buy goods of you? You sell goods to Britain don't you? And do you govern Britain? When a colonist sends you sugar, does he give it you for nothing? Does not he make you give him value for it? Give value for it, then, and you will have it still. ‘Oh, but we give ourselves a monopoly of their produce, and so we get it cheaper than we should otherwise, and so we make them pay us for governing them.’ Not you, indeed, not a penny; the attempt is iniquitous, and the profit an illusion.”

We may remark that the avowed purpose of maintaining our Colonial Empire is usually defended on grounds of “Imperial policy,” and for the “glory and prestige of extended empire.” The Colonial Office undertakes the administration, civil, military, financial, judicial, and ecclesiastical, of some fifty different communities, with various institutions, languages, laws, customs, wants, and interests. It undertakes to legislate more or less for all these colonies, and altogether for those which have no representative assemblies. It would be difficult enough to discharge these functions in a single office, if all the colonies were near each other and close to England, but they are scattered over the surface of the globe, from Labuan and Hong-kong in the east, to Honduras in the west; from the Falklands and New Zealand in the south, to Vancouver and British Columbia in the north.

The patronage of the Secretary of State for the Colonies is considerable. It consists in the nomination of the governors, lieut.-governors, commanders in chief, judges, bishops, and other Church dignitaries, law officers, secretaries, treasurers, auditors, and civil functionaries of every description in the colonies; also the members of the Colonial Executive Council, and the Crown members of the Colonial Legislative Councils. He likewise fills up vacancies in the Board of Emigration Commissioners, and such as may occur in his own office in Downing-street, where the principle of seniority is not involved.

It would be too much to expect of any individual, however talented he might be, to administer in his official capacity, all the functions we have enumerated, with strict impartiality and without incurring remarks either upon his judgment, his fair dealing, or his exercise of economy. In such a case forbearance is due to every new minister who enters the Colonial Office as Secretary, seeing that he enters upon his duties surrounded by a staff of appointments throughout the colonies, not of his own selection, but which have been made by one or other of his predecessors. Hence it need scarcely excite surprise, that the number of the officials has become gradually increased, and the amount of the salaries which many of them receive is so large as to contrast very unfavourably with the amount of duty and emolument of those in the like offices under the more frugal administration of the United States.

While the governors of thirty-eight States and Territories of the American Republic receive in the aggregate but £20,436 as salaries, or on the average £538 each, the governors and lieutenant-governors of the principal forty-six British colonies and dependencies receive from £500 to £10,000 each, or in the aggregate £132,000 per annum, being an average of £2,868. The Governor of the State of New York, a State having a population of nearly four millions, receives £800, while the Governor of Victoria, with a population of but half a-million, receives £10,000. The Governor of Canada,

ruling a population of 2,500,000, receives £7,000 a year, while the Governor of Ohio, a state over the border, with nearly the same population, receives only £360. Such disclosures are calculated to impress the generality of persons with unusual surprise; all that can be said by way of palliation amounts simply to this, that there is no accounting for the extravagance that may arise from the delusion of a cry when once it has taken firm hold upon the vanity of the people. Time out of mind have we been accustomed to laud the well-known shibboleth "Ships, Colonies and Commerce." Let us not forget how often we have indulged our unfortunate propensity to domineer, and very wantonly to exult in the proud prestige that we rule an "empire over which the sun never sets." Such a detail of the results as the foregoing may serve to remind us of the expenditure at which this prestige has been purchased and is now being upheld. It is high time that we should have outgrown the antiquated notion, that the mere extent of territory over which our flag waves is to be taken as a measure of our strength, or that many of the remote and worthless islands which we so proudly enumerate as our colonies, are to be treasured as the "Choicest jewels in the British Crown."

The next and really important consideration is, how are we to grapple with the imposing effect of this delusion? We have drawn out our reckoning of the Imperial charge, and have shown that it is not far wide of the mark at 16 per cent. upon our total exports to the colonies. It would be a mistake to suppose this 16 per cent. was, in reality, a deduction from the returns of the merchant. It is not so—the charge falls upon the country;—he receives what is his own, just as he would if he were trading to any other part of the world, so that all the loss he is called upon to sustain is his own individual share of the income tax or of any other tax he may be liable to pay.

We find still existing another popular delusion, which is deserving of notice. Some of our public journals comment upon our annual trading returns, and remark, with considerable significance, that our colonies have taken one-fourth or one-fifth, as the case may be, of all our exports. Can they have considered that if our Foreign trade of 125 millions sterling had been attended with as large an expense to the country as our colonial trade, or in other words, had our colonial trade been four or five times as large as we now find it (namely 25 millions), we should have been on the verge of national insolvency? In the last century we held a monopoly of our colonial trade, and this was deemed a source of wealth to the nation, but now the colonies are allowed to trade wherever they like, and upwards of one-half of their imports are not from Great Britain but from other countries, therefore we have at length made the discovery that we have nothing to gain, in the way of monopoly, by the conquest or retention of colonies.

If we are really desirous to retrace our steps, let us have regard to the solid character of that evidence to which we have before referred. Mr. Godley considers that when a part of the people of an old country voluntarily "swarms" to a new one, there is neither justice nor policy in permitting the emigrants to throw on those whom they leave behind the responsibility and charge of keeping the new society together, and defending it against the dangers to which its own act has exposed it. And he adds, "I must again point out that, speaking generally, no colonising country except England, and England only in comparatively modern days, has ever done so." He further states that:—"Our policy now is, to scatter garrisons over the world, on the chance that they may be wanted. I should propose keeping the troops at home, and sending them to the places where the war broke out—the Bahamas happen to be a case peculiarly in point. I find that we spend about £4,000 a year upon their defences; so that, since the peace of 1814 we have spent nearly two millions of money in defending the Bahamas, and during all that time we have never had a force there that could have resisted two frigates."

Earl Grey says:—"The House of Commons has shown so very lavish a disposition in respect of fortifications, that it is impossible for me to conjecture to what degree of extravagance in this line it may be induced to agree. "I totally disapprove of the whole policy of large expenditure upon fortifications in the colonies. The experience we have had of the past seems to me to lead to the conclusion, that almost the whole of the money we have spent upon colonial fortifications has been so much absolutely wasted; and that with respect to some of those fortifications—erected at great expense—the wisest thing we could now do would be to blow them up again."

Rear-Admiral Sir C. Elliott considers:—"That the whole fabric of our colonies, and the foreign commerce of the country, must depend upon the maintenance of our *maritime ascendancy*. Those islands must be at the mercy of any power which has command of the sea in case of general war." "I have never been able to understand what is the object of a military occupation of the Canadas. "I think that no positions should be held in strength by the Imperial Government, except such as are necessary for maintaining our maritime supremacy." And he agreed with the opinion of Earl Grey, that many of our colonial fortifications might be destroyed with great advantage.

What a commentary upon the legislative or the administrative wisdom of our country is here afforded! Discussions, with a view to action on the subject, cannot long be deferred; the honour of the crown, the commercial interests of the empire, and the claims of the tax-paying class each and all will be putting forth their demands to be considered. For the present the minister of the day may hold himself quite safe from any immediate display of popular discontent. An unsound state of public opinion has to be approached with caution, and can only be subverted by the slow process of observation, discussion, and reflection. So long as the British people remain quiescent, and do not manifest impatience on the subject of this expensive policy, the Colonial Secretary will be held excused if he should disregard economy and persevere in that policy which Mr. Gladstone has characterised as "a novel invention, of which, up to the present time, we are the patentees, and no one has shown a disposition to invade our patent."

The statistical facts and evidence which we have adduced with respect to the condition, commerce, and expenditure in, around, or for colonies, will at least serve to show that those which are strictly *colonies*, if removed from their leading-strings, are well able to support themselves in every respect, whether in a civil or military sense. Our Australian, Indian, African, or American colonies could all be made self-supporting. At present, as compared with the mother country, the colonists are very lightly taxed. They enjoy many advantages in postal facilities, in trade interchange, in the influx of settlers, and in the certainty of defensive assistance and support from the mother country, whenever foreign aggression or threatened invasion renders such aid requisite. But having arrived at maturity, there is no reason why, like improvident children, they should still continue a burden to the parent who has made such sacrifices on their behalf.

In conclusion, we have to remark upon the difficulty we have experienced during our investigation in obtaining such official returns as would enable us to furnish a complete statement of our colonial expenditure for any year of later date than 1857. Various isolated returns have been issued respecting military expenditure and other details, but the several votes and outlays are under so many departments, the War Office, the Admiralty, the Treasury, the Post Office, and the Colonies themselves, that there is no correspondence or uniformity of dates or figures. The annual colonial returns again do not tally with those of the mother country. The declared values of the imports sent from here never agree with those entered in the Customs returns of the colonies, the exports at the latter part of one year falling into the imports of the next.

We have shown that, in the years referred to, our entire expenses, military, naval, civil, judicial, and ecclesiastical, amounted to £4,115,737. These expenses, enormous as they appear, are constantly increasing; the military charges of 1859, were £2,947,309, and by the last return for 1862-3 they reached £3,718,467; whilst the contributions put down as the probable but uncertain amount receivable for like purposes, from the colonies, are only £109,280. The remedies proposed by the various witnesses examined before the Select Committee of 1861, on Colonial Military Expenditure, are deserving of the serious consideration of the British people.

The colonies are entirely independent in the conduct of their foreign trade, and the trade they carry on with the mother country does not amount to one-half of the whole general trade. Therefore, in the name of British commerce, we may venture to disclaim the existence of any advantage as derivable from colonial dependence to Great Britain.

During the last century, it was supposed that we derived some sort of exclusive advantage, which in effect amounted to a taxation of them; but since then colonial affairs have become so far changed that the colonists are now taxing us. Whatever portion of this annual drain upon our exchequer is deemed to be necessary or expedient for Imperial purposes, is an affair which must be allowed to rest with the Legislature to determine. We have looked in vain for any evidence in support of this wet-nursing of our colonies; the system has evidently had its day, and the result has been a mortifying disclosure of ill-success.

APPENDIX.

MINUTES OF EVIDENCE.—COLONIAL MILITARY EXPENDITURE. (APRIL 18, 1861.)

J. F. Elliott, Esq., Assistant Under-Secretary of State for the Colonies.

19. NORTH AMERICAN COLONIES.—The Imperial military expenditure in respect of these colonies for the year ending March 31, 1859, exclusive of transport to and from the colonies, was £378,441; and the aggregate contribution for the same purpose, £35,268. Population (1858) was, Canada, 2,700,000; the others, 700,000. The troops in Canada, 3,000; the others, 2,300.

349. NEW ZEALAND.—Imperial military expenditure, £104,077. Colony contributed nothing.

135. AUSTRALIAN GROUP, including Tasmania, £136,831. Colonies contributed £75,459. Tasmania contributes nothing, exempt on account of convicts.

481. SOUTH AFRICAN COLONIES.—Imperial military expenditure, Cape of Good Hope, £479,599. Colony contributed £40,467. The troops, 10,000. Kafir war expenses for three last years, per annum, £500,000. (592.) Civilisation of Kafirs, expenses, £222,000; 1861, £27,000. (612.) Colonial revenue of Cape (1858), £463,000.

619. BERMUDA.—Population, whites, 4,569; coloured, 6,413; convicts, 1,000; total, 11,982. Revenue, £9,800.

635. BAHAMAS.—Imperial troops, £33,003. Nothing contributed.

650. ST. HELENA.—Imperial troops, £35,447. Contribution, £453. (661.) For protection of trade.

662. FALKLAND ISLANDS.—Imperial military expenditure, £1,744. No contribution. (668.) Held to prevent bad uses.

670. JAMAICA. — Imperial military expenditure, £113,949. Contribution, £182. Troops, 1,568.

685. HONDURAS.—Imperial expenditure, £24,609. No contribution. Troops, 413.

697. WINDWARD AND LEEWARD ISLANDS AND BRITISH GUIANA.—Imperial expenditure, £196,300. Contributions, £32,481. Troops, chiefly black, 2,187.

714. CEYLON.—Imperial expenditure, £119,728. Contribution, £85,851. Troops, 2,470.

731. LABUAN.—East India expenditure, £6,897. No contributions.

738. GAMBIA.—Imperial expenditure, £26,729. Contribution, £160.

739. GOLD COAST.—Imperial expenditure, £16,348.

H. W. S. Whiffin, Assistant-Accountant-General, War department.

747. Knows nothing of the "contributions." They have not been brought to the credit of the Imperial government.

General Sir John F. Burgoyne, Inspector-General of Fortifications.

His evidence is principally on the importance of a large expenditure in fortification of our colonies.

Appendix No. 7, page 281.

Rough estimate of the cost of completing works in progress and new works necessary to place the undermentioned foreign possessions in a reasonable state of defence, in addition to the sums in the estimates for 1861-2, exclusive of armaments and ordinary barracks, and of such occasional improvements as art and science may from time to time render necessary:—

Gibraltar	£25,000
Malta	75,000
Corfu	75,000
Mauritius	250,000
Bermuda	150,000
Halifax	75,000
St. Helena	25,000
Cape of Good Hope	25,000
Trincomalee	36,000
Hong-kong, Bahamas, Falkland Isles Jamaica, Antigua, Kingston, and Quebec.....	264,000

Total£1,000,000
(Signed) J. F. BURGOYNE, I.G.F.

NOTES ON THE EMPLOYMENT OF BRITISH SHIPPING IN THE COLONIES.

In the last volume of "Colonial Statistics," prepared at the Statistical Department of the Board of Trade, returns were given showing the extent of the employment of British shipping in the several colonies. These statistics were much wanted for the purpose of ascertaining the total employment of the shipping of the British Empire.

Up to the year 1857, it was only ascertained that the five and a half millions of tons of shipping which belonged to the British Empire participated in 60 per cent. of the total trade of the United Kingdom, amounting, of late years, to about 13 million tons annually. Since the returns of the nationalities of vessels trading in the colonies have been furnished, it appears that the same five and half million tons of British shipping also participated in 60 per cent. of the total trade of the colonies, amounting in the year 1857 to about 16 million tons.

The following are the statistics relating to the subject:—

1.—TONNAGE BELONGING TO THE BRITISH EMPIRE IN 1857.

	Tons.
To United Kingdom	4,491,377
British colonies	1,040,510
	5,531,887

2.—TONNAGE EMPLOYED IN THE BRITISH EMPIRE IN 1857.

TOTAL ENTERED.	BRITISH.	FOREIGN.	TOTAL.
	Tons.	Tons.	Tons.
At Ports in United Kingdom	6,853,000	4,621,000	11,474,000
„ in British Colonies*	8,389,000	5,442,000	13,831,000
„ in British Empire	15,242,000	10,063,000	25,305,000
Proportion to Total	60	40	100

* No returns were furnished for British Guiana, but the amount could not materially affect the total for the colonies.

In the foregoing Table, the entries of vessels only are given, in order to avoid including a certain amount of tonnage twice over, which would occur if the entrances and clearances were given. For instance, the tonnage of

vessels which clear direct from the colonies appear, for the most part, in the entries at the United Kingdom, and *vice versa*.

For an approximation of the total trade of the British

POPULATION, REVENUE, DEBT, AND FOREIGN COMMERCE OF THE DEPENDENCIES OF THE BRITISH EMPIRE, CHIEFLY FOR THE YEAR 1859.

COLONY.	Population according to the last return.	Revenue.	Debt.	Value of Imports.	Value of Exports.	Total external commerce.
	£	£	£	£	£	£
EASTERN—						
India	185,908,277	36,060,788	97,851,807	34,545,650	30,532,298	65,077,948
Ceylon	2,000,000	747,037	None.	3,474,487	2,524,752	5,902,239
Mauritius and Seychelles.....	313,047	609,634	None.	2,025,890	2,544,793	4,570,683
Straits Settlements	273,774	125,453	None.	7,811,698	7,422,855	15,334,553
Hong Kong	86,941	70,000	None.	Not stated.	Not stated.	—
Labuan	1,774	6,707	None.	30,724	6,358	37,082
AUSTRALASIAN (Population, 1860)—						
Victoria	548,412	3,257,724	8,000,000	15,622,891	13,867,860	29,490,751
New South Wales.....	348,546	1,511,964	2,500,000	6,597,053	4,768,049	11,365,102
Queensland	28,056	160,000	None.	521,695	609,794	1,131,489
South Australia.....	117,967	511,927	830,200	1,507,494	1,655,876	3,163,370
Western Australia	15,593	57,945	None.	125,315	93,037	218,352
Tasmania	81,492	429,425	345,260	1,163,907	1,193,898	2,357,805
New Zealand (European only)	83,919	459,649	500,000	1,551,030	551,484	2,102,514
AFRICAN SETTLEMENTS—						
Sierra Leone	38,318	31,432	None.	169,727	247,261	416,988
Gambia	6,939	15,599	None.	76,150	110,364	186,514
Gold Coast	151,000	8,286	None.	114,596	118,563	233,159
St. Helena.....	5,490	20,736	None.	120,181	21,465	141,646
Cape Colony.....	267,096	650,925	868,711	2,579,359	2,021,371	4,590,720
British Kaffraria	—	—	None.	—	—	—
Natal	160,170	50,905	165,000	199,917	110,415	310,332
MEDITERRANEAN POSSESSIONS, &c. —						
Gibraltar	17,750	32,500	None.	Not stated.	Not stated.	—
Malta.....	145,802	147,385	None.	2,428,909	1,775,794	4,204,703
Ionian Islands	233,973	130,262	300,000	1,306,303	649,057	1,955,360
Aden	—	—	—	—	45,297	—
Heligoland	2,800	—	—	—	—	—
Falkland Islands	540	7,657	None.	13,890	6,892	20,782
NORTH AMERICAN COLONIES—						
Canada (Census 1861).....	2,501,370	1,947,829	11,661,010	4,953,396	6,711,032	11,664,428
Nova Scotia	277,117	139,788	200,000	1,620,191	1,377,826	2,998,017
New Brunswick	193,800	160,107	226,025	1,416,034	1,073,422	2,489,456
Prince Edward's Island	80,872	27,402	28,966	234,698	178,680	413,378
Newfoundland	122,638	133,735	182,500	1,323,288	1,357,113	2,680,401
Bermuda	10,982	16,765	None.	160,914	41,420	202,334
Vancouver.....	18,000	—	—	—	—	—
British Columbia	6,000	50,000	None.	177,219	168,000	345,219
WEST INDIAN POSSESSIONS—						
British Honduras	29,000	27,982	None.	175,293	288,161	463,454
British Guiana	127,695	275,618	449,802	1,179,901	1,228,844	2,408,745
Jamaica.....	377,433	279,935	913,607	853,015	961,007	1,814,022
Bahamas	27,619	30,727	None.	213,166	141,896	355,062
Turk's Island	3,300	11,067	900	42,655	33,488	76,143
Trinidad	68,600	180,174	232,417	734,902	820,606	1,555,508
Barbados	135,939	87,595	None.	1,049,237	1,225,572	2,274,809
Grenada.....	35,517	16,948	9,400	124,660	131,307	255,967
Tobago	16,363	9,100	—	57,691	77,897	135,588
St. Vincent	30,128	19,911	—	131,451	178,990	310,441
St. Lucia	30,000	12,832	15,000	103,973	101,879	205,852
Antigua.....	36,000	34,446	47,500	203,997	289,063	493,060
Montserrat	7,053	3,513	—	19,718	16,746	36,464
St. Kitts	20,741	17,845	None.	110,835	136,511	247,346
Nevis.....	9,571	4,721	None.	34,748	48,186	82,934
Virgin Islands	6,053	19,993	None.	10,075	11,789	22,864
Dominica	25,023	14,211	8,000	66,506	96,861	163,367
Totals for Colonies, exclusive of India ...	9,126,311	12,585,396	26,884,298	62,088,322	57,840,681	119,429,003

empire, the amounts above stated for the entries may be doubled, which would give in millions the following results:—

AT PORTS IN	TOTAL ESTIMATED TONNAGE ENTERED AND CLEARED IN THE BRITISH EMPIRE IN 1857.		
	British.	Foreign.	Total.
The United Kingdom...	14	9	23
„ British Colonies ...	16	11	27
„ British Empire	30	20	50
Proportion to Total	60	40	100

It will be seen from the first statement that the tonnage belonging to the colonies forms about one-fifth of the total tonnage belonging to the British empire; and supposing the whole tonnage to have been equally employed during the year 1857, by deducting one-fifth from the total British tonnage employed, there will be a remainder of 24 million tons to represent the employment of shipping belonging to shipowners of the United Kingdom.

These returns are exclusive of vessels engaged in the coasting trade of the United Kingdom, and of the Colonies; and also of the indirect trade between foreign countries.

It is hardly necessary to observe that these figures also serve to show the extent of the commerce of the British empire, which afforded employment in 1857, in its foreign and colonial trades, to no less than 30 million tons of

ABSTRACT OF THE SEVERAL BRANCHES OF EXPENDITURE IN THE BRITISH COLONIES OUT OF THE BRITISH EXCHEQUER IN THE YEAR 1857.

COLONIES.	Area.	EXPENDITURE OUT OF IMPERIAL TREASURY. (Par. Paper, No. 240 of 1859.)							REMARKS.
		Military. (Including Fortifications and Barracks.)	Naval Charges.	Judicial, including Justices, Police, Jails, and Prisoners.	Ecclesiastical.	Civil, including Governors, Secretaries, Clerks, Pensions, Steamers (Post-office), and Establishment.	Public Works and Miscellaneous, including Hospitals, Light-houses, Surveys, Indian Department, Works and Miscellaneous.	TOTAL.	
	Sq. Miles.	£	£	£	£	£	£	£	
Gibraltar ...	1 ³ / ₈	332,803	74,996	15,790	—	—	—	423,589	
Malta ...	115	376,704	65,460	—	—	—	568	442,722	
Cape of Good Hope, } including Natal	142,930	554,992	54,822	—	—	—	72,201	682,015	
Mauritius ...	708	34,753	38,199	with Civil	—	1,229	700	74,881	
Bermuda ...	20	82,175	32,553	37,373	—	5,900	60	158,061	
St. Helena and } Ascension ..	*47	42,730	9,739	—	—	10,171	—	62,640	{ The only expenditure at Ascension is £2,731 for Naval Charges.
Heligoland ...	—	—	213	with Civil	—	981	80	1,274	
Ionian Islands ...	1,041	174,090	23,870	—	—	—	1,510	199,470	
Falkland Islands ...	13,000	383	1,277	with Civil	—	4,544	319	6,523	
Hong Kong ...	29	85,501	209,932	—	—	8,302	—	303,735	
Jamaica ...	6,400	147,982	26,780	7,065	8,099	3,485	300	193,711	
Bahamas ...	3,522	33,967	3,646	—	47	1,953	12,432	52,045	
Honduras ...	17,000	21,644	12,158	—	—	—	—	33,802	
Other West Indies, } including Guiana, } and Trinidad	79,467	241,457	22,491	12,990	11,298	16,460	1,285	305,981	
Canada ...	242,482	208,980	17,545	—	3,285	209	6,465	236,484	
Nova Scotia ...	15,620	132,426	18,080	—	3,389	—	710	154,605	
New Brunswick ...	27,037	—	8,880	—	300	250	—	9,430	
Prince Edward's Is- } land ...	2,173	—	—	—	—	1,500	—	1,500	
Newfoundland ...	35,850	15,961	236	—	500	—	3,417	20,114	
Vancouver Island } and British Co- } Columbia ...	†234,836	—	210	—	—	—	—	210	
West Coast of Africa†	6,300	105,678	9,553	with Civil	—	7,508	2,300	126,039	{ Does not add in original, £1,000 more.
Ceylon ...	24,700	89,479	20,235	—	—	—	9,565	119,279	
Labuan ...	50	8,035	—	with Civil	—	4,410	—	12,445	
North Australia ...	—	5,666	—	—	—	—	—	5,666	Exploring Expedition.
Western „ ...	45,000	25,678	a 11,291	54,256	—	1,800	4,744	94,769	
South „ ...	300,000	9,940	—	—	—	—	—	9,940	
Victoria ...	86,944	34,075	10,038	—	—	—	—	44,113	
New South Wales ...	478,861	39,171	14,143	6,220	—	—	|| 112	59,646	
Tasmania ...	22,629	39,610	1,591	55,935	—	—	—	96,936	{ Does not add in original, £200 less.
New Zealand ...	95,000	103,429	8,966	—	—	—	—	112,395	
Sundry Colonies ...	—	—	b 71,737	—	—	—	—	71,737	
TOTAL ...	1,881,762 ³ / ₈	2,947,309	768,631	189,620	26,918	68,702	113,768	4,115,757	{ Difference of £800 in gross addition in original.

* Area for St. Helena only.

† From Almanac de Gotha of 1861.

‡ Including Gold Coast, Sierra Leone, and Gambia; the area of Gambia is not included in 6,300 square miles, it not having been ascertained.

§ Justices' Salaries only.

|| Removal of Pitcairn Islanders to Norfolk Island.

a Including transport of convicts.

b Provisions for Troops on Passage to Colonies.

British shipping, and to 20 million tons of foreign shipping—making a total of 50 million tons.

DISCUSSION.

Mr. M. H. MARSH, M.P., said the question before them was that of the advantages and cost of our colonies. With regard to the advantages, he thought Mr. Ashworth had made some little miscalculation as to the amount of our trade with them. Last year it amounted, exclusive of India, to no less than £28,000,000 sterling. The fact was that their being colonies created a trade, in some inconceivable manner, much greater than if they were not colonies. He would instance the contrast between California and Australia as an illustration of this. California had produced about the same quantity of gold as Australia; the population of each district had much the same tastes—the same gold diggers going from one to the other. Our exports to California last year were something like £600,000 sterling, while the exports to Australia amounted to no less than ten millions. Such were the advantages of a colony over a country which was not a colony. But it might be said the exports did not go directly to California, and that a large portion went to America. Our exports to America were £9,000,000, and to Australia £10,000,000, so that, even from that point of view, the colony had the advantage. Take the Mauritius; the inhabitants had not the natural tastes of Englishmen; but, simply from the fact that it was a colony of England, their trade with this country was greater than that of Mexico. It was three times as much as that with the principalities of Moldavia and Wallachia. If those principalities were under the Government of this country he ventured to say our exports to them would reach £10,000,000 within five years. The trade of Mauritius was twenty times as much as that with Persia, merely from the fact of its being a colony. Such were some of the advantages which we derived from our colonies. On the other hand, what were the advantages which the colonies themselves derived? Where this country obtained one advantage the colonies derived infinitely more. Their commerce was everywhere protected, and they participated in all the advantages which this mighty empire could confer. The consequence was, that although there were some things in various portions of our colonial empire which no one could approve of—although in some of them there might be corruption, and in others a democracy so wild that the most advanced liberals of this country would tremble at it—still they found amongst all those colonies the most unbounded loyalty, and the most complete affection towards the mother country. He now came to the question of the cost of those colonies, and in the consideration of that question they ought to reckon what the cost of that vast commerce would be supposing we had no colonies. First of all there was Malta. They had three large garrisons and a magnificent fleet of fifteen ships of the line, and in the Mediterranean they had no colonies; they were merely stations for our ships, which were necessary in these days of steam, because without coal steam was useless. He had not been able to ascertain exactly what our commerce with the Mediterranean was, and with regard to the trade with Spain and France he had no means of knowing the proportion which went to the Mediterranean ports; but our whole trade with the Mediterranean was nothing like that with our Australian colonies, whilst the cost of it was ten or twenty times greater; therefore he thought our trade with countries where we had not colonies cost a great deal more than where we had colonies. He now passed to the African colonies—such as Lagos—they were expensive; that was on account of the slave trade. If we chose to be virtuous we must pay for it. It was our will to put down slavery, and there would have been no virtue in this if we had made other people pay for it. We had gained much in the estimation of the world, and would probably gain

more in that of posterity, for putting down that abominable traffic, but we must pay for it. St. Helena had been mentioned. That was a place which we must have as a depot for coal. It was no colony. There were no settlers. It was simply an emporium for coal, and was a most desirable place to hold—not so much now as it used to be—but still it was a place which must be kept up if we wished to have the command of the seas. Then he came to the Cape of Good Hope. That was a very expensive colony. We had had Kaffir wars which cost enormous sums of money. He was a member of the Committee of the House of Commons on Colonial Defences, and he asked of more than one of the witnesses, "Supposing we had allowed the inhabitants of the colony to deal with the Kaffirs as they liked, would the war have been so expensive?" The reply of all was, "There would have been no war at all." He was not prepared to say there might not have been a great deal of irregularity, but he thought there would not have been so much absolute cruelty as was supposed; but he would not dispute that we were right in not allowing the colonists to deal with the Kaffirs in their own rough way. But there again, if we choose to be virtuous we must be content to pay for it, and we had done so. Then he came to Ceylon. That island, he must say, at a future period should be amalgamated with India, by which, he believed, we should save £80,000 a year. With reference to Mauritius he had already stated that we had an extensive trade with that colony. If we had no trade at all—if it were a mere rock, we must have the Mauritius if we wished to maintain our naval supremacy to protect our commerce. We took Mauritius in the year 1810 or 1811, and it would be remembered that, during the war with France, the privateers of that country robbed our British merchants to no less an extent than seven millions sterling. This country took possession of Mauritius, and had held it ever since. Now with regard to Hong-Kong: that was no colony. It was a station to protect our commerce in China. It was a place we must keep; but it must not be put down to the charge of colonial expenditure. Then as to Western Australia: that was a convict colony, and was exceptional. We chose to send convicts there, because there was a certain class of convicts who must be got rid of for life; and it was opposed to humanity to keep them in penal servitude in this country all their lives. We must leave some hope even for the worst of mankind, and there was no other way of meeting the case than having this little recess in Western Australia as a refuge for them. He now came to Australia Proper; the charge upon this country was very little, because the colonists paid for nearly the whole themselves, and as they possessed great wealth in the gold diggings, no doubt they might pay the whole; and he believed they would very shortly do so. With regard to Queensland, the cost to the Home Government was very trifling. The total number of troops there was eight rank and file, for the purpose of drilling volunteers. He now came to New Zealand. That was something like the Cape, and when on the committee of which he had already spoken, he put the same question to the witnesses, and the reply was, that if we had let the colonists alone there would have been no war. Before we took possession of the country there was a great deal that was wrong, but there never was any war. The whalers in the Bay of Islands used to deal roughly with the natives, but there was no war, and there was no need to have some of our finest frigates on that station, and 7,000 troops maintained at an enormous expenditure. If we did these things we must pay for them. With regard to the Falkland Islands, they again were merely a position, and seemed to cost a few thousands a year, but they were an important position, and more so at the present time than ever for the protection of our vast commerce round the Horn. He now came to our West Indian colonies. There, again, the influence of the slave trade came in. There was no doubt that we had ruined the West Indies.

No doubt we had gained in reputation; no doubt we had done what was right; but at the same time we had ruined the West Indies, and we could not now turn round and say "We cast you adrift." During the administration of Mr. Canning, the West Indies did not like some of the proceedings of the Home Government, and he recollected Mr. Canning saying, "We have two holds upon them; we can withdraw our troops, or we can let in other sugar at the same duty as theirs. Either of these steps will be their ruin." We had let in other sugar—and very properly—at the same duty as the West Indian; but he thought we could not withdraw our troops. It would be dishonourable to withdraw our military occupation after that, besides which, many of the West India Islands served as garrisons, like the Bahamas. Reverting to Australia, he would remark that we had only two frigates to guard the commerce of something like ten millions sterling. How much larger a force we had to keep up in South America, in Mexico, with only a fifth part of the commerce? If Mexico were a colony of this country we should not want a fleet there. Bermuda was a similar case to Gibraltar and Malta. He then came to Canada. That was entirely an exceptional case. It was the only instance in which we had a colony upon the borders of a formidable foreign power, and he did not see how we could make that colony individually pay for the whole cost of its protection. If all the colonies united to pay for it, that would be fair, but it would hardly be fair that Canada should pay for its own protection. But the probability was that Canada would not much want protection hereafter. The United States were not likely to be so formidable in future as they had been heretofore; and he thought the Canadians, with the steady courage of the English and the gallant onslaught of the French, were likely to give a good account of any invaders who came near them. An observation was made in the paper relative to the comparative cost of governors of the American provinces and of English colonies. It was said that the salaries of the American governors were very much less than those in the British colonies; but there were collateral advantages in the former case which he would not now particularly refer to, but which did not exist in the latter. These were some of the benefits which both the mother country and the colonies derived from each other, and he hoped never to see them severed.

Mr. HERMAN MERIVALE said his honourable friend who had just sat down had anticipated a great deal of what he had intended to say, and in what he had to add he had no intention to attempt to refute the observations in the paper they had heard, many of which he believed to be unassailable, but merely to show with how large limitations they must be taken. The cost of our colonies was put down at from three to four millions a year; but we must remember, once for all, that we had nothing to do with all the stations which it had been the policy of past times to establish all over the world. Whether it was wise to take Gibraltar and hold it as a threat to other powers was not a colonial question—whether we should allow the fortifications of Corfu to fall to pieces was not a colonial question—whether we chose to pay for keeping down a few convicts in Western Australia was not a colonial question, or whether we chose to fortify the Mauritius was not a colonial question, but one, whether it was worth while to protect our trade between India and Africa. When the list was reduced to colonies properly so called, we had to deduct from the number New Zealand and the Cape. Whether it was wise to spend hundreds of thousands of pounds in fighting a few natives in the most expensive manner possible, was a question he would leave wiser people than he to settle. All he could say was, he wished attempts at reform were directed to those points where so much room for them existed, instead of mixing them up with colonial defences, with which they had very little to do. With regard to our great possessions—our North American empire, our Australian and West Indian empire—as to these, it could not be

made out that we spent a million a year upon them. The honourable gentleman who had read the paper called attention to the large salaries that were paid to the governors of our colonies—in Canada £7000 and in Victoria £10,000 a year. This country, however, did not pay them—the colonies paid them; all we paid was for the soldiers kept there, and that was the principal charge upon us in consideration of the commerce of our great colonial empire; and could there be a greater delusion than to suppose, while we paid this amount for our colonial trade, we paid nothing for our foreign trade? What was half our large fleet for, except to keep foreign powers in awe, and to protect our foreign commerce? It was one of the greatest mistakes to suppose that our expenditure was large, when compared with the amounts which we spent on the other elements of our great power and on our foreign trade. Let this million a year be reduced to its component parts. With Australia we had nothing to do; we were told that they were ready to pay their half million of expenditure. With regard to the West Indies, they cost £300,000 for military protection; but the consideration whether we ought to pay that sum depended upon our views of slavery, and on the question whether we ought to let those islands fall into the hands of Americans, French, or Spaniards. He would now fix his mind upon that which he believed was most weighing on the thoughts of all present, viz., our relations with our great North American empire. Let them observe the way in which this question was put. We said to Canada "You are a population of two and-a-half millions; you are a courageous race; you handle the rifle well; we spend some £100,000 a year in protecting you against foreigners. Why should we do that? Why should not you, who are the richer of the two in some respects, bear the expenses of your defence? You say you prize your English connection, and you do not want to be handed over to any other power; why don't you then pay the trifle which your protection costs?" That was the way to put it. But let then, for a moment, try to get rid of the habit of looking at the matter from a merely English point of view, and placing the mother country and Canada in the position of plaintiff and defendant in this cause, hear what Canada would say—"We do prize our connection with England; we are Englishmen at heart; we would rather belong to England than to any other power, and when any sacrifices are called for, we show that that is our feeling. As we did in 1812 so we would do again; but to call upon us to tax ourselves because you—England—choose to be perpetually quarrelling with America, is unreasonable. It is the liability to attack by the United States which is the price we have to pay for our connection with you; and we do not intend to pay the additional price of maintaining the troops required to keep out the incursions of the Americans." Then said the plaintiff, Great Britain—"It is you Canadians who are a standing menace to America, because America is wanting to have you; therefore we must protect you. We say we are really paying all this money, which is a loss to us, that you Canadians may have the pleasure of belonging to us, you being the constant cause of our American quarrels." "Well," would reply Canada, "look to facts; during the last ten years you have been three times on the verge of blows with the United States. The first was, because America would not allow you to overhaul her ships and take away the slaves; was that a Canadian quarrel? The second was because you could not agree upon a boundary. Was that a Canadian question? The third was because an American ship took into custody two people from the Confederate States on board a British ship. Was that a Canadian question?" During that period he could remember no question arising between America and Canada. That being so, he asked whether Canada had not some reason for saying, "If you think it worth while to continue the connection you must pay for it." Then they came to the question which was at the bottom of the whole thing. Was it worth while or not keeping up the connection with Canada at this price? That lay at the foundation of

everything? It was too large a subject for him to enter into now; only when they talked of the independence of Canada, it was taking a rather sanguine view of the case. That country was upon the frontier of America, and whether or not the people were partial to American connection, the gravitation towards America would be too strong to allow a large and defenceless country like Canada to remain long in a state of independence. The latest accounts from America seemed to indicate that the union of the States was likely to hold together, and in the cause of humanity he, for one, rejoiced in that prospect, but the chances were various; there might be great alterations in territorial boundaries, and therefore he thought it was rather premature to agitate, at the present moment, the question of the separation of Canada, whilst they did not know the course of events which were in progress of accomplishment.

Mr. A. J. RIDGWAY said one question had been overlooked—that was, how the colonies could protect themselves. That bore very much on the question of emigration. He contended if they had a good system of emigration the colonies could maintain themselves, and contribute greatly to the benefit of the mother country. The establishment of all these great colonies had cost the mother country a vast amount of money. Look at the expense which had been incurred in establishing New South Wales. The Cape had never repaid the expense of its establishment, and a cost of £90,000 had been incurred by sending the German legion to colonise there whilst the government refused to send our own people out. He maintained that the best assistance that could be given to the colonies was by sending our surplus population to those parts where population was wanted, and there was no place where it was more wanted than in New Zealand, relative to which colony, however, gentlemen in the House of Commons appeared to be not so well informed as they ought to be. Mr. Ridgway having spoken in condemnation of the policy that had been pursued by the government in New Zealand, proceeded to criticise some of the figures given in the paper relative to the value of the exports to the colonies.

Sir DANIEL COOPER, as an Australian, did not agree with the figures given in the paper as to the amount of the exports to Australia. He had passed all his life in that colony, and was well acquainted with all its affairs. He contended that the Australian colonies proper—viz., Victoria, New South Wales, and Queensland—were now free from obligations to this country. They had always come forward to meet their expenses ever since they had a responsible government. He had been a member of the legislature of the colony for many years, and he would state that the import trade of British goods into the Australian colonies was not ten millions, but was sixteen millions in the last year as made up from the returns of the colony. New South Wales paid, in 1860, £20,000 for military defences. The naval defences had no right to be reckoned, inasmuch as the ships of war entering the harbours were entirely beyond the control of the Colonial government, and came in and went out as they pleased, but they were liberally treated by the colonists whilst they were on the coast. They also made liberal allowances to the military; and the cost of the whole military establishment for South Australia was not more than £60,000 a year, towards which £25,000 had been contributed by the colonists. Thus they had from twelve millions to sixteen millions of exports to Australia against an expenditure of only £60,000 for the military establishment, as a *quid pro quo*. Year after year the local legislature had declined to tax British commodities. There was no tax upon British goods either in Victoria, New South Wales, or Queensland; though there was a 5 per cent. *ad valorem* duty at Adelaide. Those who stood as candidates for the colonial Parliament knew the difficulties they had to contend with on the hustings upon this point. There was universal suffrage, and every working-man was in favour of protection. The colony

was admirably adapted for manufactures, and the sooner it set about them the better. If they were to put a duty of 5 per cent on British goods they could pay for the miserable protection they received five times over. If there was any obligation in money matters, it was this country which was under obligation to the Australian colonies. He wished to state that, as an Australian, he did not consider himself under any obligation to this country. They were faithful subjects of the Queen, and had so shown themselves on all occasions. At the conclusion of the Crimean war he was Speaker of the New South Wales Parliament, and a proposed vote of £100,000 towards the Fund for the Widows and Orphans of the Soldiers was negatived, because it was thought better to leave it to voluntary subscriptions, which were collected to the amount of £70,000, and the same spirit of liberality and sympathy was displayed during the mutiny in India and the distress in Ireland. He lived in Australia at the time when New South Wales comprised all the other colonies. He looked upon them all as one, and he would say they had come forward and paid their way manfully. If we wanted them to pay for the soldiers they would do so, but they must put a tax upon British manufactures; therefore the mother country could take her choice of the two things. At the same time he admitted that there had been a great deal of abuse and land jobbing, by which this country had lost millions of money. In Australia the natives had not been thought of. In Tasmania they had been swept off to an island, and had become extinct. They were fortunately not in favour at Exeter-hall, and this country had in consequence been saved a war in that colony. If civilisation and bishops had been introduced among the natives they should have had war long ago. They all knew very well what was at the bottom of the New Zealand war.

[The Chairman then left the chair, which was taken by Mr. Wm. Hawes, Vice-President of the Society.]

Mr. PETER GRAHAM said no mention had been made in the paper of the import trade from the colonies, which he regarded as being quite as important as the exports. Hence the calculation of the cost of the colonies ought to be reduced one-half. With regard to the imposition of duties upon British manufactures going into Australia, the colonists would only be taxing themselves.

Mr. JOHN CRAWFORD (late Governor of Singapore) expressed the pleasure with which he had listened to the paper of his friend Mr. Ashworth, and he agreed with almost every word stated in it, although he disagreed with much that had fallen from the hon. member for Salisbury and the gentleman who followed him, notwithstanding that gentleman's long experience in these matters. There seemed scarcely to be any end to the exceptions taken by Mr. Marsh. The subject became, every moment, "smaller by degrees and beautifully less," until he thought there really seemed no colony left to make an observation upon. The hon. gentleman had compared the exports to California with those to Australia, the latter having a population of 1,250,000, and California only about 300,000. Such a comparison was out of the question, and then to compare the Mauritius with Moldavia and Wallachia was really very much out of place. Mauritius was a costly place to the mother country. It was in some measure a garrison, and we must pay a good deal for it; but nearly the whole revenue of the Mauritius was derived from import duties, and this country had to pay the great bulk of it. There were certain of our colonies the naval and military charges of which this country must continue to disburse. They might be regarded as so many stationary fleets intended for the protection of our commerce, and the expenditure on that account must be continued. Hong-Kong, Malta, and Gibraltar were all of this character. With respect to the expenditure upon fortifications, he considered it most useless and absurd. The proper defence of our colonies was our navy. The fifty colonies were virtually defended by the navy and by no other power, and what was the

navy for if it was not for the defence of our colonies? Mr. Marsh had talked of amalgamating Ceylon with India. He was sure the people of Ceylon did not wish that, inasmuch as they were terrified at the idea of being taxed like the people of continental India. He hoped such amalgamation would never be carried into effect. Thirty years ago Ceylon did not produce a single pound of coffee; the production at present was 300,000 cwt. annually, of the very best coffee, which formed the great bulk of the supply of that article to this country. The former state of things existed under the rule of the old East India Company, and he was gratified at having had a large share in destroying that large and misused power. The only other subject to which he would refer was with reference to the salaries of the governors of American States. He would not ascribe corruption to the American governors, because he did not believe it to exist; but the conditions of the parties were very different. The governors of our colonies had, in some cases, to go half across the globe to their places, and they remained in them only four or five years. The American governors were on the spot: it was a high honour to be appointed to the post, and it was attended with little additional expense. He protested against all protective duties in our colonies. The manufacture of woollen goods might be to some extent carried on in Australia; but with the skilled labour and machinery of the English manufacturer, they would find themselves beaten both in price and quality; and they would find 5, 6, or even 7 per cent. duty no protection at all.

The CHAIRMAN (Mr. Hawes) rose to propose a vote of thanks to Mr. Ashworth for his paper. He would refer to only one or two points in the paper, and principally with a view to point out the inaccuracy of some of the statements made. He thought it unfair to this subject, unworthy of its importance, and quite unnecessary for the argument which ran through the paper, to charge the whole expenditure for the colonies upon our exports alone, if, as was quite clear, the exports and imports were equally benefited by the protection afforded by the naval and military services of the mother country. If we measured the value of the colonies by the amount of money we paid for the protection of the trade, and ignored the political and moral influence they gave to the empire, we must distribute it over, not only the exports, but also the imports from those colonies. There was also another large branch of trade the paper did not refer to, which would fairly be chargeable with a portion of the expense, and that was the inter-colonial trade between the different colonies, which amounted to a sum that again very much reduced the per centage of expenditure. For instance, there was the large trade in tea, coffee, rice, and sugar, &c., &c., between India the Cape, Mauritius, and other colonies, carried on in English ships and by English merchants, and which certainly ought to be charged with a portion of the expenditure incurred for the protection of the colonies and their trade. If then they divided the £4,200,000 over the larger amount obtained, by adding the imports and the inter-colonial trade, instead of the Australian trade costing this country four per cent. it would be less than one per cent.; North America, instead of ten per cent., would be only two-and-a-half; and the West Indies, instead of twenty-two per cent., would be something under six per cent. But he took an objection to the paper on another ground—that was, the tone that was adopted towards the colonies, and especially towards the colonists, who, inhabiting as they did a part of the British empire, prided themselves on being our fellow-countrymen. If the colonies were a portion of the Great British empire, of which we were so justly proud, and if the colonists were British subjects and fellow-countrymen, then it was unworthy of us to measure their value simply by the per centage cost of their trade, but we ought to look upon that expenditure—avoiding all extravagance, and conducting it with proper economy and efficiency—not as a tax upon the commodities which passed from one to the other, but as the cost of

the protection which the mother country afforded to every British subject and his property in every part of the world. That was the great object of this expenditure; and he believed the history of this country, and its appreciation by the world at large, proved that on the whole we had carried out the system of colonisation so successfully that, in the language of Mr. Gladstone, very few countries had attempted to trespass upon "the patent" we had so long enjoyed, of knowing how to colonise and then how to manage the colonies after they were established.

The vote of thanks having been passed,

Mr. ASHWORTH, in acknowledging the compliment, and referring to the question of statistics, said he had taken his figures from the last Parliamentary Returns published, which did not bring up the annual expenditure in a complete form to a later date than 1857. With regard to the Australian exports, the first gentleman who addressed them stated the amount to be £28,000,000, whilst he (Mr. Ashworth) had not found any return for a larger amount than £26,500,000—a difference not worth quibbling about. The gentleman, being connected with Australia had, no doubt, other returns in his possession. The same gentleman had in his remarks brought down the probable future expense of that colony to a very low figure—so low as to become unimportant to the colonists to meet—but he had said nothing about the ships of war, provided at the expense of the mother country, that were continually on the stations for the purpose of defence. From the incomplete way in which Navy returns were furnished, it was impossible to collect what proportion of the twelve and a half millions voted for the Navy was due to the colonies. If the British colonial trade could not be carried on without 630 ships of war to protect it, we must be content to pay for it, but he was unwilling to suppose that so large an expenditure was required for the protection of an honest commercial intercourse. With regard to the salaries of the governors, the accounts were very much mixed up with other disbursements, and he had met with but one instance in which he had discovered that the amount was provided by the colony.

Mr. CRAWFORD said the salaries of the governors were always voted by the local governments.

Mr. ASHWORTH, referring to the remarks of Mr. Hawes, said there was no return that he knew of ever made of the intercolonial trade; the colonies were quite at liberty to trade wherever they liked, and as far as regarded the advantage to this country of any imports from the colonies, there was nothing to thank the colonists for, inasmuch as they would not send their goods to this country unless they were satisfied that they could get no more money for them elsewhere, and if the trade were a profitable one it would come whether there was a large naval and military expenditure or not.

The Secretary announced that on Wednesday evening next, the 2nd April, a Paper by Mr. Frederick Walton, "On the Introduction and Use of Elastic Gums and Analogous Substances," would be read.

The following letter has been received by the secretary:—

"SIR,—As a South African colonist I deem it due to the British inhabitants of the country where I reside to enter a respectful protest against a statement made in Mr. Ashworth's paper.

"The writer of that paper either affirms or implies that the colonists of South Africa, actuated by motives worse than mercenary, have by their harsh and immoderate treatment of the natives, encouraged the terrible wars that, in times past, have devastated the frontier districts of the Cape, and that, in fact, for the sake of pecuniary gains, they are prone to ill-use the coloured races.

"I had hoped, like most other colonists, that this hallucination—I can call it nothing better—had been

superseded by a truer understanding of the colonist's real position, and a kindlier appreciation of his desires and motives, but as it has once more been repeated, under such influential auspices, I must now crave permission to deny altogether the assertion, and to disclaim the influences imputed to us.

"When will our English countrymen understand that the colonist has all to lose—security, property, and prospects—by the infliction of an aboriginal war? When will they believe the truth that the colonists are as desirous to see the native improved and elevated—as anxious for his civilisation and Christianisation—as earnest in their efforts to ameliorate his condition and advance his social status, as the most sincere British philanthropist could desire?"

"The paper in question is evidently not based on a practical knowledge of facts. As regards the payment of governors, I may state that not only is the salary of her Majesty's representative in all the colonies a charge on the local revenue, but that, *par exemple*, the young colony of Natal lately offered, through its elective legislative, to raise the emoluments of the Lieut.-Governor from £1,200 to £3,000 per annum, in order to secure the services of a man fitted, by experience, to manage a colony occupied by a mixed population and possessed of representative institutions. This was simply a voluntary increase, by a small settlement, of the patronage of the crown. Was that illiberal, disloyal, or anti-national?"

"As a significant illustration, moreover, of the commercial and economical aspect of the question, I may also cite Natal. Ten years ago that colony consumed about £100,000 worth of British manufactures, and exported produce to the extent of £20,000. In 1861 the imports had increased to £300,000, and the exports to £120,000. Taken individually, these figures are, of course, insignificant, but looking beyond the present, and accepting them as an earnest of future progress, they indicate a boundless multiplication of British trade. Natal is by no means an exceptional instance of progress. Other colonies have advanced, under special conditions, far more rapidly. If one-third of the commerce of Great Britain is now absorbed by her colonies, it needs little prescience to foresee what it will become ten or twenty years hence.

"I am, &c.,

"JOHN ROBINSON.

"Strand, 27th March, 1862."

Home Correspondence.

THE ALBERT NATIONAL MEMORIAL.

SIR,—I send some extracts from the letters of a lady in Scotland, graphically describing the successful steps to enable the poor in her parish to take their part in this memorial. I think it suggests a course of action which the Council of the Society might follow up. The Lord Mayor's Committee has collected about £42,000—scarcely half the sum necessary. The rich have been the chief subscribers, but the memorial will not be a national one unless the mites of the poor are received. To receive them, an organisation is needful, which should extend to every parish and every workshop in the United Kingdom. The Society took the lead in the large subscriptions, but its work will be only half done if it does not take means to obtain the shillings and pennies of the millions.

I am, &c.,

AN OLD MEMBER.

"Few of these people comparatively ever go near the banks or even the towns, and would feel shy about going to important-looking public officers to offer their small tribute, where so many much larger were registered, and the result will, therefore, be that generally throughout the rural and pastoral districts, no opportunity will

be afforded for the widely scattered and humbler but not less attached and intelligent subjects of her Majesty to testify on this occasion their deep sense of the nation's loss, and their tender sympathy for their beloved Queen's sorrow under her irreparable bereavement; and I am very sure that, as the Prince did indeed live to devote his great qualities and talents especially to ameliorate the condition and to raise and improve the humbler classes of the Queen's subjects, that they are by no means the ones least aware of this, or most incapable of appreciating the noble, pure, and Christian brightness of the Prince's character, and the light which it shed abroad in this country. It would be a sad pity if every facility were not given to them, as well as to others, to contribute their small but not less heartfelt offerings. Mere subscription papers lying at the county banks will never effect this.

"On the sad day of the Prince Consort's funeral this pastoral parish had its little church hung with black, and old and young assembled with tearful eyes to offer up their fervent and sympathising prayers for their beloved Queen in her hour of need; and many a shepherd, who came far over the moors for that occasion, would do so again many a mile to give his humble offering, who would yet feel very shy of going out of his own parish to do so, from a feeling of the little he had to give. But as the ocean is made up of many drops, and the rainbow of many hues, Scottish hearts know that their Queen would not despise their small offerings because they had no more to give, and therefore the point is to make it easy and simple in every parish for all to give where a National Memorial is intended.

"In our own parish here we are going to have a subscription paper to lie at the parish school, under charge of the schoolmaster, who will take down names and subscriptions, however small, and forward the whole amount to the Central County Committee. This has been intimated in every church from the pulpit, and I have no doubt but we shall get a considerable sum which would never otherwise be got. But unless some such arrangement is carried out universally, vast districts will not be included at all, and a large fund be lost, which can ill be spared, from the national subscription, especially if Glasgow and Aberdeen are, as is very natural, to have separate Memorials of their own.

* * * * *

"Since my other letter to you we have carried out in our little parish here the plan I mentioned for putting it in the power of every individual to subscribe, however small a sum, even from one penny upwards, by announcing from the pulpit here that subscription papers were to lie at every school-house (as well as the parish one) in the parish, where all were invited, rich or poor, high or low, to add their mite, however small, to the National Memorial. This was accompanied by a few words of explanation, expressing the belief that it was Her Majesty's wish that all her subjects should have the power if they had the wish to subscribe, and as many had had no opportunity of reading or even hearing of those two touching letters of the Queen's, some passages from them were read, and I am sure there was not a dry eye. The schoolmasters (we have three in our parish) are instructed to take charge of informing every person in their several districts that these subscription papers for receiving even the smallest sums, do lie at each school, and of encouraging and inviting all to give as they are able; and I am perfectly sure the result will be, that hardly one person in the parish will not subscribe, and that *con amore*. Indeed already a great many have 'thanked' me 'for getting this here arranged,' 'as they never otherwise would have gone with the little they could give, away to the towns and banks there to offer such small sums,' and 'I am sure' (one man said to me) 'that little we are as anxious to give to show our love for the Queen and respect for the Prince's character, as if we had hundreds to give.' Another working man (one of my farm servants) said to me

two days ago, 'we were just the other night, ma'am, saying that unless some better plan was arranged for getting at all the working classes of Scotland, both town and country, the labouring men of Scotland should try and get up a Memorial themselves to Prince Albert, for there isn't a man, ma'am, who wouldn't (and here he took his cap off) be proud to put his hand in his pocket to make the memorial truly a national one, and to show his own attachment to Her Majesty, and what a noble Christian character the Prince's was, and how much he did for this country.' I could fill pages with what they say, and that, too, said with tears in their eyes—for Scottish hearts are warm as well as loyal, and Scottish heads are intelligent, and could and did appreciate the Prince's character and accomplished mind; and they adore their Queen, and that is something, considering that distance prevents them from seeing her ever almost. But the point of all this is just to show you how successful the subscription would be, if it could be really systematically gone about in this personal way all over the kingdom; and I am much mistaken if the small sums would not immensely increase the total amount; and, besides making it really a more national thing, they can be ill-afforded to be lost to the Fund—if the Memorial is to be all it should be. I am quite convinced of the truth of the contents of this letter, and also of the fact that the money will not be got by any less minute arrangement."

MEETINGS FOR THE ENSUING WEEK.

- MON.....** British Architects, 8.
 Chemical, Anniversary, 8.
 Medical, 8½. Clinical Discussion—Dr. Thudichum, 1. "On Crystallized Deposits of Xanthine." 2. "Azoturia." 3. Dr. Cockle, "Practical Observations on Valvular Diseases of the Right Orifices of the Heart."
 Royal United Service Inst., 8½. Capt. F. A. B. Craufurd, "Experience gained in a short Cruise to the West Coast of Africa, in connection with the Slave Trade and Commerce."
TUES.... Civil Engineers, 8. 1. Capt. Douglas Galton, R.E., F.R.S., "Railway Accidents." 2. Mr. Brunlees, "Railway Accidents."
 Pathological, 8.
 Photographic, 8.
 Ethnological, 8. Mr. John Crawford, President, "On the Antiquity of Man from the Evidence of Language."
 Royal Inst., 3. Mr. John Marshall, "On the Physiology of the Senses."
WED.... Society of Arts, 8. Mr. Frederick Walton, "On the Introduction and Use of Elastic Gums and Analogous Substances."
 Geological, 8. 1. Mr. J. W. Kirby, communicated by Mr. T. Davidson, "On some remains of Chiton from the Mountain-limestone of Yorkshire." 2. Rev. W. B. Clarke, "On the Occurrence of Mesozoic and Permian Fauna in Australia." 3. Prof. Owen, "On some Reptilian Remains from the Coal-measures of the South Joggins, Nova Scotia." 4. Mr. A. Tylor, "On some Fossil Foot-prints from Hastings."
 Pharmaceutical, 8.
THURS.... Royal, 8½.
 Antiquaries, 8½.
 Linnean, 8. Mr. Charles Darwin, M.A., F.R.S., "On the Three Remarkable Sexual Forms of *Catasetum tridentatum*, an Orchid in the possession of the Linnean Society."
 Chemical, 8. Dr. Debus, "On the Influence of the Quantitative Method on the Development of Scientific Chemistry."
 Royal Society Club, 6.
 Artists and Amateurs, 8.
 Royal Inst., 3. Professor Tyndall, "On Heat."
FRI..... Royal Inst., 8. Commissioner M. D. Hill, "On the Post-office."
 Archaeological, 4.
 Royal Horticultural, 2.
SAT..... Royal Inst., 3. Professor H. E. Roscoe, "On Spectrum Analysis."

To Correspondents.

ERRATUM.—In last number of the *Journal*, page 291, col. 1, line 56, after "paid" insert "to foreigners."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 5th and 6th March, 1862.

Par.
Numb.

30. Railway and Canal Bills (81. Horsham, Dorking, and Leatherhead Railway; 82. Kingston and Eardisley Railway; 83. London and South Western and Andover and Redbridge Railway; 84. London, Brighton, etc. Railway (New Lines); 85. Lostwithiel and Fowey Railway, Manchester, Sheffield, and Lincolnshire Railway (Additional Powers), (Liverpool Central Station); 86. Newport and Ryde Direct Railway; 87. North British and Glasgow and South Western Railway, and other Companies; 88. North British Railway and Carlisle and Silloth Bay Railway and Dock Companies, North British Railway and Port Carlisle Dock Railway Companies, North British Railway (Monktonhall and Ormiston and Dalkeith Branches); 89. North Devon and Okehampton Railway, North Devon Railway and Dock; 90. North Eastern and Hull and Holderness Railway Amalgamation; 91. North Eastern Railway (Blaydon and Conside), (Hull and Doncaster Branch), (Market Weighton and Reverley Extension, etc.), (Team Valley Extension); 92. Norwich and Spalding Railway; 93. Severn and Wye Railway and Canal; 94. South Leicestershire Railway; 95. Spalding and Bourn Railway; 96. Stamford and Essendine Railway; 97. Swansea Harbour Trust; 98. Tottenham and Hampstead Junction Railway; 99. Waterford and Limerick, and Limerick and Ennis Railway; 100. West Midland and Severn Valley Railway, and (Additional Powers); 101. Weymouth and Portland Railway, and Extension to Harbour)—Board of Trade Reports.
61. Local Acts (2. Andover and Redbridge Railway; 3. London, Chatham, and Dover Railway (Junction at Battersea); 4. Moretonhampstead and South Devon Railway; 5. Norwich and Spalding Railway; 6. Tendring Hundred Railway; 7. Weymouth and Portland Railway, and Extension to Harbour; 8. Tyne General Ferry Company; 9. An-over, Redbridge, and Southampton Railway; 10. North Devon Railway and Dock Company; 11. Bishops Waltham, Botley, and Bursledon Railway (No. 1));—Admiralty Reports.
42. Piers and Harbours (7. Deal and Walmer Pier and Harbour Company)—Admiralty Report.
- Morocco—Supplementary Convention.

Delivered on 7th March, 1862.

54. East India (Army Amalgamation)—Return.
 Ionian Islands (Mission of the Right Honourable W. E. Gladstone)—Papers.

Copies of the under-mentioned Papers, presented by Command, will be delivered to Members of Parliament applying for the same at the Office for the Sale of Parliamentary Papers, House of Commons:—

8. Turnpike Trusts—Third Report from Secretary of State.
 9. Do. Fourth Do.
 10. Army (Libraries, &c.)—Report.

Delivered on 8th and 10th March, 1862.

56. Public Income and Expenditure (1859-60 and 1860-61)—Account.
 74. Ecclesiastical Manors—Return.
 43. (1. Trade and Navigation—Accounts (31st January, 1862.)
 82. Duchy of Cornwall—Account.
 92. Harbour, &c. Bills; (1. Dagenham (Thames) Dock; 2. Weston super Mare Pier; 3. River Don Harbour; 4. Ventnor Harbour; 5. Tyne General Ferry)—Board of Trade Reports.
 29. Bills—Transfer of Stocks (Ireland).
 30. " Crown Suits (Isle of Man).
 31. " Industrial Schools Acts (1861) Amendment.
 Ecclesiastical Commissioners for England—14th General Report.

Delivered on 11th March, 1862.

90. Revenue Departments—Estimates.
 91. Post Office Packet Service—Estimate.
 30. Railway and Canal Bills (102. Alford Valley Railway; 103. Bala and Dolgelly Railway; 104. Birkenhead Dock and West Cheshire Junction Railway, Birkenhead, Flintshire and Holyhead Railway, Birkenhead Railway; 105. Corwen, Bala, and Portmadoc Railway; 105. Dublin and Meath Railway; 107. Great Western Railway (Oswestry, Shrewsbury, and Ellesmere Lines); 108. Hatfield and Saint Alban's Railway; 109. Hull and Hornsea Railway; 110. Isle of Wight Railway)—Board of Trade Reports.

Delivered on 12th March, 1862.

83. Ramsgate Harbour—Abstract of Account.
 85. Hops—Return.
 87. Cotton Goods—Return.
 88. Bullion—Return.
 96. Military Education—Return.
 67. Schools, &c. (Scotland)—Return.

30. Railway and Canal Bills (111. Kettering and Thrapstone Railway; 112. Launceston and South Devon Railway; 113. Llanelly Railway and Dock, Llynvi Valley Railway; 114. Merionethshire Railway, Merthyr, Tredegar, and Abbergheny Railway; 115. Mold and Wrexham Railway; 116. Moretonhamstead and South Devon Railway; 117. Nantlle Railway, Newcastle (County Down) Railway; 118. Ramsgate, Sandwich, Deal, and Dover Railway; 119. Tendring Hundred Railway)—Board of Trade Reports.
61. Local Acts (12 to 15 Lancashire and Yorkshire Railway (Doncaster, Goole, and Hull Junction Lines), South Yorkshire Railway (Extension to Hull), Hull and West Riding Junction Railway, North Eastern Railway (Hull and Doncaster Branch); 16. General Electric Telegraph Company; 17. The United Kingdom Electric Telegraph Company; 18. Lostwithiel and Fowey Railway; 19. Caledonian Railway (Leith Branches); 20. Severn and Wye Railway and Canal; 21. North Eastern Railway (Blaydon to Conside); 22. North Eastern Railway (Team Valley Extension); 23. London, Brighton, &c. (New Lines); 24. Newport and Ryde Direct Railway; 25. Bristol Port Railway and Pier; 26. Bristol and South Wales Union Railway; 27. Weston super Mare Pier; 28. Hull South Bridge)—Admiralty Reports.
92. Harbour, &c. Bills (5. Berwick upon Tweed)—Board of Trade Report.

Delivered on 13th March, 1862.

32. Metropolis Rates—Return.
89. Public Schools—Copy of Royal Commission.
94. Army (Dr. MacLoughlin)—Papers.
98. Admiralty—Account.
32. Bills—Turnpike Tolls Exemption (Scotland).
36. " Courts of Justice Building.
37. " Pier and Harbour Act Amendment.

Delivered on 14th March, 1862.

86. Duchy of Lancaster—Account.
103. Committee of Selection—4th Report.
104. Topographical Survey (Scotland)—Return.
38. Bills—Whipping (No. 2).
39. " Small Houses Exemption (Scotland).
- Civil Service—7th Report of Commissioners.

Delivered on 15th and 17th March, 1862.

80. Army (Maps, &c.)—Return.
105. Railway and Canal Bills—Third Report from Committee.
29. East India—Papers.
33. Bills—Public Houses (Scotland) Acts Amendment.
40. " Clergy Relief.
61. Local Acts (29. Bristol and Clifton Railway; 30. Bristol and South Western Junction Railways; 31. Brean Down Harbour; 32. Sevenoaks Railway; 33. London and North Western Railway (Additional Powers); 34. Birkenhead, Flintshire, and Holyhead Railway; 35. Falmouth Waterworks)—Admiralty Reports.

Delivered on 18th March, 1862.

81. Education (Revised Code)—Copies of Memorials and Letters (Part 1).
30. Railway and Canal Bills (120. Bristol and Exeter, and Chard and Taunton Railway; 121. Carnarvonshire Railway; 122. Cowbridge Railway; 123. Edinburgh and Glasgow and Caledonian and Dumbartonshire Junction Railway; Edinburgh and Glasgow, Dumbarton, and Helensburgh Railway; Edinburgh and Glasgow Railway; 124. Edinburgh, Perth, and Dundee, and Fife and Kinross Railway; 125. Ellesmere, Ruabon, and Shrewsbury Railway (Oswestry, Ellesmere, and Whitchurch Railway); 126. Great Northern and Western (of Ireland) Railway; 127. Greenock and Wemyss Bay Railway; 128. Llanidloes and New Town, Mid Wales, and Manchester and Milford Railway; 129. London and North Western Railway and Chester and Holyhead Railway (Capital); 130. Mid Sussex and Midhurst Junction Railway; 131. North British Railway; Edinburgh, Perth, and Dundee Railway; 131. North British Railway; Edinburgh, Perth, and Dundee Railway, and West of Fife Railway and Harbour; 132. Oswestry, Ellesmere, and Whitchurch Railway; 133. Stockton and Darlington Railway (Towlaw and Crook); 134. Wellington and Cheshire Junction Railway; 135. Wellington, Drayton, and Newcastle Railway; 136. Whitchurch, Wrexham, Mold, and Connah's Quay Junction Railway)—Board of Trade Reports.

Delivered on March 20th, 1862.

28. Police (Counties and Boroughs)—Reports of Inspectors.
96. Divorce and Matrimonial Causes—Returns.
82. Harbour, &c. Bills (6. Pulteney Harbour)—Board of Trade Report.
106. Customs Acts (1860)—Return.
- Topographical Department, War Office—Report.

Delivered on March 19th, 1862.

- 112 (1.) Civil Services—Estimates (Class 1.)
- 112 (2.) Ditto. Ditto. (Class 2.)
- 112 (6.) Ditto. Ditto. (Class 6.)

Delivered 21st March, 1862.

107. Royal Atlantic Company—Return.
110. National Portrait Gallery—Return.
61. Local Acts (36. Kent County Gaol and Lunatic Asylum (Water Supply; 37. Vale of Clwyd Railway; 38. Ventnor Harbour; 39. Shard Bridge)—Admiralty Report.
41. Bills—Charitable Donations and Bequests (Ireland).
42. " Burials.
45. " Smoke Nuisance (Metropolis) Acts Amendment.
50. " Inclosure.
51. " Sale of Spirits.
- Church Estates Commissioners—Eleventh General Report.

Dated 22nd and 24th March, 1862.

61. Local Acts (40. Pulteney Harbour)—Admiralty Report.
81. (1.) Education (Revised Code)—Copies of Memorials and Letters—Part 2.
81. (2.) Education (Revised Code)—Copies of Memorials and Letters—Parts 3 and 4.
95. East India (Transport Service)—Return.
109. Admiralty and War Office—Return.
113. Immigrants and Liberated Africans—Return.
114. Railway and Canal Bills—Fourth Report of the Committee.
115. Navy (Ships of War)—Return.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, March 21st, 1862.]

Dated 16th November, 1861.

2881. J. Grint, 45, Harrison-street, Gray's-inn-road—Imp. in pegs nails, or like fastenings, for uniting the soles of boots and shoes, and other substances.

Dated 18th November, 1861.

- 2 890. J. M. Clements, Birmingham—Imp. in the making or manufacturing of certain parts of garments for either sex, likewise in the manner of preparing the same for sale, as also an improved button to be attached to garments without sewing.

Dated 25th January, 1862.

202. J. Brown and J. Davenport, Bolton—An improved lubricating apparatus applicable to pistons.

Dated 31st January, 1862.

264. E. H. C. Monckton, Fineshade, Northamptonshire—Imp. in the application of electricity for obtaining ammonia, and other useful products, during the combustion of coal and fuel, and in the apparatus employed therein.

Dated 12th February, 1862.

364. G. J. Aman, Liverpool—Imp. in envelopes or bags to hold grain, or similar substances, for transmission by post or as parcels.

Dated 21st February, 1862.

468. S. Smith, 204, High Holborn—Imp. in electro-magnetic engines for obtaining and applying motive power.

Dated 22nd February, 1862.

482. R. Foster, jun., Beeston, Nottinghamshire—Imp. in the construction of horticultural and other similar buildings or erections.

Dated 3rd March, 1862.

572. R. Shaw, jun., Portlaw, Waterford—An imp. in firearms by a more convenient method of placing the ramrod in position.

Dated 5th March, 1862.

598. W. Hensman, Woburn, Bedfordshire, and W. Hensman, Jun., Linslade, Buckinghamshire—Imp. in steam ploughs, and in apparatus connected therewith.

Dated 7th March, 1862.

608. M. B. Newton, King's-cross—Imp. in the manufacture and construction of junction and other drain pipes in clay or other plastic materials.
610. J. Revell, Dukinfield, Cheshire—Imp. in securing the rails of railways and tramways to the chairs.
612. J. Fowler, jun., D. Greig, and R. Noddings, Leeds—Imp. in apparatus for cultivating or tilling land.
614. R. Wright, 18, Albany-road, Camberwell—Imp. in heating and clarifying saccharine fluids.
618. H. B. Coathupe, Junior United Service Club, Saint James's—Imp. in the manufacture of clips, hooks, and other such like fastenings.

Dated 8th March, 1862.

620. H. Fletcher, 82, Wood-street, Cheapside—An improved clip for securing the steel or other expanders of crinolines to the suspenders thereof.
622. A. Blair, Dawsholm Print Works, Dumbarton, N.B.—Imp. in rotatory engines.
624. S. S. Bromhead, Bristol—Imp. in the construction of boxes or receptacles for coals.

626. J. Deane, jun., King William-street—Imp. in revolving fire-arms.
 628. P. J. Guyet, Paris—Imp. in water meters.
 630. W. Clark, 53, Chancery-lane—Imp. in brims and peaks of hats, caps, and other coverings for the head. (A com.)
 632. J. Fleming, Mincing-lane—Imp. in machinery for pressing cotton. (A com.)
 634. L. R. Sykes, New Coventry-street—Imp. in gloves.
 636. J. J. H. Gebhardt, Lawrence-lane—An improved fastening for albums and other books, bags, reticules, and other articles. (A com.)

Dated 10th March, 1862.

638. J. Duncan, Greenock—Imp. in the manufacture of vinegar.
 640. R. A. Brooman, 166, Fleet-street—Imp. in producing by the aid of photography copies of maps, charts, plans, and drawings. (A com.)
 642. W. Spence, 50, Chancery-lane—Imp. in projectiles. (A com.)
 644. A. C. Macleod, Hanover-square—Imp. in ventilating hats and coverings for the head.
 646. A. Barclay, Kilmarnock, Ayrshire, N.B.—Imp. in traction engines, and in apparatus for indicating the pressure of steam.
 650. H. M. Kromschroeder, 32, Princess-terrace, Regent's-park—Imp. in gas meters.

Dated 11th March, 1862.

654. W. Barter, Brixham—Imp. in apparatus for propelling vessels, and for enabling them to work off lee shores during storms.
 658. C. Hall, Navestock, Essex—Imp. in implements for breaking up the soil, and in ropes and drums to be employed in the cultivation of the soil by steam.
 662. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in attaching artificial teeth to plates and to each other, and in moulds for forming artificial teeth. (A com.)

Dated 12th March, 1862.

668. W. H. Latham and F. C. W. Latham, Bolton—Certain imp. in machinery or apparatus for cutting paper, pasteboard, and other similar substances.
 670. J. Johnson, Heaton Norris, Lancashire, and S. Morris, Stockport, Cheshire—Imp. in steam boilers.
 672. E. Molyneux, jun., Seaview, Enniskerry, Wicklow, Ireland—An improved method of utilizing the waste heat of the products of combustion as they escape from a furnace, and securing a more complete combustion of the fuel.
 674. A. M. A. Beckett, Surbiton, Surrey—Imp. in railway signal apparatus.

Dated 13th March, 1862.

680. J. S. Hendy, Essex-street, Strand—An imp. in the construction of chimneys and chimney pots.
 684. J. Hunter, Ayrshire, N.B.—Imp. in apparatus for removing slag from furnaces.
 686. H. Fletcher, Market-street, Manchester—Imp. in cleaning and preparing cotton, and the machinery used for that purpose.
 690. S. F. Bonnetterre, C. T. Erhart, and J. F. Monti, 51, Rue de Malte, Paris—An improved apparatus for regulating the pressure of steam in steam boilers and the combustion in their furnaces.
 694. S. K. Thompson, Coniston, and A. T. Thompson and S. Mawson, Bolton-le-Moors, Lancashire—Imp. in railway apparatuses for communicating between guard and driver, and for coupling and uncoupling the carriages, parts of which apparatuses are applicable to connecting pipes and tubes.
 696. H. Fletcher, 82, Wood-street, Cheapside—Imp. in neck ties, scarfs, cravats, and collars.
 698. E. Bolten, Warrington—Improved apparatus for transferring liquid matters from one vessel to another.

INVENTION WITH COMPLETE SPECIFICATION FILED.

745. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—A new or improved means of arresting headstrong or runaway horses. (A com.)—18th March, 1862.

PATENTS SEALED.

[From Gazette, March 21st, 1862.]

March 21st.	March 21st.
2136. J. B. Fondu.	2417. D. McCallum.
2371. H. Plantrou, jun.	2426. D. Lane.
2382. T. Davey.	2429. M. Theiler.
2383. C. Watt, J. Watt, and T. S. Haviside.	2435. J. Lush.
2384. J. Fawcett.	2448. W. H. Payn.
2392. R. A. Brooman.	2449. W. S. Hogg.
2400. T. Bentley.	2463. J. C. Dickinson.
2402. J. Openshaw, W. Entwistle, and J. Lord.	2476. E. T. Hughes.
2405. S. S. Robson.	2497. W. Squire.
2410. V. S. Lété.	2452. T. B. Collingwood and A. Butterworth.
2412. W. Clark.	24. E. Nugent.
	80. W. Clark.
	132. T. Newton.

[From Gazette, March 25th, 1862.]

March 25th.	March 25th.
2317. J. Eastwood and J. B. Joyce.	2499. A. Chaplin.
2401. H. Nunn.	2507. W. Catford and J. S. Westley.
2415. G. Smith.	2508. H. Willis.
2421. G. J. Ganier and E. E. Collet.	2512. I. Evans.
2423. W. N. Wilson.	2519. J. Norman.
2425. J. Reeves.	2539. A. English.
2434. B. G. George.	2588. T. Wild and T. Hodson.
2442. W. E. Matthews.	2652. G. Davies.
2444. O. O. Lesourd.	3146. W. R. Rogers.
2460. E. Breffit.	3172. M. Hanff.
2461. H. Breffit.	3256. G. H. Birkbeck.
2467. H. Law.	61. J. Brunt.
	234. T. Meriton.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, March 21st, 1862.]

March 17th.	March 18th.
691. R. Mushet.	702. J. Howden and A. Morton.
692. A. L. Thirion.	712. J. Roberts.
703. R. Mushet.	713. S. Leoni.
704. W. and S. Pickstone.	March 19th.
	707. W. Haggett.

[From Gazette, March, 25th, 1862.]

March 20th.	March 22nd.
795. T. D. Shipman.	733. C. A. Watkins.
March 21st.	744. J. H. Johnson.
721. W. A. Gilbee.	746. F. Tillett.
722. W. Weild.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, March 21st, 1862.]

625. B. O. Stratford, Earl of Aldborough.

[From Gazette, March 25th, 1862.]

March 26th.	March 22nd.
671. J. Marland.	655. W. Brown.
March 21st.	680. G. L. Turney.
700. J. Blair.	

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4443	February 22.	Tilt Gear for Lawn Mowers...	Kennard and Sons ...	18 and 19, Fishamble-street, Dublin.
4444	" 26.	Spectacles ...	{ John Kent Turner, of the firm of Walters and Co. }	Globe Works, Sheffield.
4445	March 1.	Window Lift and Catch...	Thomas Pemberton and Sons.	Birmingham.
4446	" 3.	The Indispensable Office Knife ...	John Roberts and Sons ...	Pye-bank, Sheffield, Yorks.
4447	" 4.	Spring Pattern Card ...	Alfred Sommersville ...	Birmingham.
4448	" 4.	Collar and Cravat ...	James Wheeler & Chas. Tighe.	23 and 24, Poultry, E.C.
4449	" 4.	Regulator for Platform Weighing Machines.	James Garland...	Birmingham.
4450	" 4.	Tessatempora (Carriage) ...	Charles Sandford Windover...	Huntingdon.
4451	" 7.	{ The Registered Lining for Fruit and Dessert Dishes and Plates ... }	George Wing ...	{ 8, New Church-street, Sheffield, Yorks. }
4452	" 11.	A Shirt Collar ...	Benjamin Nicoll ...	42, Regent's-circus, Piccadilly, W.
4453	" 12.	{ Improved Rotating Brush for Cleaning and Polishing Boots and Shoes ... }	Charles Topham ...	31, Bush-lane, Cannon-street, E.C.
4454	" 15.	Sponge Bag ...	Alfred Warn Banks ...	67, Newgate-street, E.C.
4455	" 19.	The Oxford Travelling and Dressing Bag...	Mappin and Company ...	77 and 78, Oxford-street, W.
4456	" 20.	Parallel Vice ...	Nicholson and Evans ...	Havelock Works, Sheffield.
4457	" 26.	{ Cottam's Ventilating Sill for the Stalls and Loose Boxes of Stables ... }	Cottam and Co. ...	2, Winsley street, Oxford-street, W.

Journal of the Society of Arts.

FRIDAY, APRIL 4, 1862.

THE NATIONAL MEMORIAL TO THE PRINCE CONSORT.

The Council of the Society of Arts, taking a deep interest in the success of the proposal to erect the National Monument to the Memory of the Prince Consort, their lamented President, and considering that it is due to all the subjects of the Queen, that every individual amongst them, however humble, should have the opportunity of contributing his mite towards this object, have agreed to the following report:—

1. The subscriptions hitherto have been limited almost exclusively to those of the wealthy and mercantile classes, whilst a very small portion has been subscribed by the people generally. The Nobility and Gentry, the City Corporations, Banks, Mercantile Firms, Municipal Corporations, and the like, have been addressed by the Committee presided over by the Lord Mayor of the City of London. No steps, however, have been taken, nor does it appear that any are contemplated, to make known to each individual man and woman constituting the body of the people, and residing either in the Parishes and Hamlets of the United Kingdom or in the Colonies, the Memorial which it is proposed to erect, nor has any opportunity been hitherto afforded them of adding their contributions to the general fund. If this were done, all would affectionately unite with their Queen in raising a Monument to the memory of the Prince who neglected no opportunity to promote their welfare. It is only through very extended parochial and other agencies, that the necessary information can be generally given, and the Council has, therefore, determined forthwith to invite influential persons, representing all the great interests of the country, the Church of England, and other religious denominations, as well as the great employers of labour, to unite with them as a Committee to convey this information, and to make such arrangements as

may afford to every one of her Majesty's subjects, throughout the United Kingdom and the Colonies, the opportunity of taking a part, however humble, in promoting the Memorial, by subscriptions however small.

The Queen, "following the movement of her people," has asked "to be allowed to take part with them in doing honour to her beloved Prince;" and the Council, believing that the women of England especially will rejoice to work in concert with their Queen, intend to invite Ladies to be Members of the proposed Committee.

2. Should more funds be realised than will be required to carry properly into effect the Monument "on a scale of sufficient grandeur," as stated in the communication made by the Queen's command to the Lord Mayor, it will be for Her Majesty, who has already pointed out the character of the intended Monument, to decide on the application of any surplus to some object of comprehensive utility which the Prince Consort had at heart.

By order of the Council,

P. LE NEVE FOSTER,

Secretary.

INTERNATIONAL EXHIBITION OF 1862.—SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £47,950, have been attached to the Deed.

EXAMINATIONS, 1862.

NOTICE TO LOCAL BOARDS.

The attention of Local Boards is particularly drawn to Par. 14 of the Examination Programme, as follows:—

14. The previous examinations must be held by the Local Boards sufficiently early in the year 1862 to allow the results to be communicated to the Council, on a form which will be furnished on application, on or before the 23rd April, *i.e.*, four weeks before the commencement of the final examinations.

Any Local Boards expecting to have Candidates desiring to be examined in music, should apply to the Secretary of the Society of Arts without delay, who will furnish them with a copy of a form of test to be used at the Previous Examinations, as mentioned in paragraph 112 of the programme.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

THE past week has witnessed the entire disappearance of the gigantic dome scaffolds; not a vestige of either now remains, and many a one who will gaze upon those clear vaults of glass will be puzzled to know how such lofty and vast structures were raised and put together in the short period of three months. Now that these great stages and net-work of climbing pillars have been removed from the building, the raised platforms under each dome are being vigorously pushed forward, and a few days will see them completed. It is intended to reserve seats on these platforms for those who are invited to attend and take part in the opening ceremonial.

The past week has been signalised by the insertion of Mr. Hartley's stained glass into the large circular window, in the tympan of the eastern entrance. This window is thirty feet in diameter; and viewed from any portion of the nave or galleries, is brilliant in its colouring. It is to form the disc of an immense clock-face, forty-five feet in diameter, to be furnished by Messrs. Dent and Co. The western window will be filled in a similar manner.

Scaffoldings are now erected against the walls in which these windows are set, and Mr. Crace's artist-hand will soon be busy in completing this portion of the decoration, which alone remains to be perfected to render the *coup-d'œil*, from end to end of the spacious and vaulted nave, not to be rivalled by the interior of any other building.

The little progress made in the fittings of the French court contrasts unfavourably with the immense strides made during the past week by the British exhibitors. The arrangement of their stalls and exhibiting cases is geometrical,

and converging to a centre. In order to render the seclusion—which they have obtained by partitions—more complete, they have barricaded all the entrances to their portion of the building, while the words "*On n'entre pas ici*" sufficiently indicate their desire to be left to themselves.

Most backward of all in this race of nations are the Austrians, who, up to the present time, have only a single package to fill the space allotted to them.

All praise is due to the Belgians, whose courts are well advanced towards completion.

The eastern annexe has been completed, and a gang of painters is now employed in decorating the ribs. Stalls, galleries, and green-houses, are now rising in this portion of the building, as if by magic. Agricultural implements and steam-engines are taking up their positions, and many a case containing costly goods only waits to have its cover removed to display its treasures.

The scene in the western annexe is still one of bustle and confusion. The work, however, is progressing rapidly; and now that all the heavy foundations are in, no fear is entertained as to its speedy completion.

Through every door bales and cart loads of goods are arriving in incessant and unvarying succession, which is as interesting to watch for a day as it would be monotonous to gaze at for a week. Along the Cromwell and Prince Albert's roads, carts, drays, and waggons of all descriptions, from the greengrocer's cart up to Pickford's vans, drawn by teams of from two to fifteen horses, stand in line four and five deep.

Now and then some ponderous iron casting or huge machine is seen slowly rolling along, harnessed to Bray's traction engine, which, with thick and short pants, moves steadily to its destination. In front stands the steersman, who manages, with his revolving wheel, to a hair's breadth the movements of this street locomotive.

On the 1st instant there were no fewer than 201 waggons, carts, &c., waiting at the several doors of the building to be unloaded.

Inside the building the visitor is struck with the appearance of confusion, and every element of chaos heaped around; but a few minutes' attention shows that this apparent chaos is under control, and that, owing to the arrangement, zeal, and ability of the staff connected with every department, coupled with the energy of the exhibitors—each one doing his own work—the multifarious cases, packages, and boxes are falling into their places.

The number of packages received in one day during the past week amounted to 4,459, or only 300 less than the greatest number received during the busiest week which preceded the opening of the Exhibition of 1851.

Some slight idea may be gained of the duties discharged by the staff when it is stated that during the week ending on the 29th inst., there were 18,000 letters despatched and 8,000 received.

The 1st of May will see everything in order. The following is the outline of the ceremonial, so far as its general principles have been approved by the Queen and the various functionaries who will take part in it :—

CEREMONIAL TO BE OBSERVED AT THE STATE OPENING OF THE INTERNATIONAL EXHIBITION.

The Queen, being most anxious to mark her interest in the success of an undertaking, in promoting which the Prince Consort had taken a most active part, has notified her wish that the opening of the Exhibition should bear as much as possible the character of a national ceremony. Her Majesty has, therefore, been pleased, under the present impossibility of herself performing that ceremony, to appoint his Royal Highness the Duke of Cambridge, K.G., his Grace the Archbishop of Canterbury, the Lord High Chancellor, the Earl of Derby, K.G., the Lord Chamberlain, and Viscount Palmerston, K.G., G.C.B., to be her representatives to conduct it in her name.

I. Her Majesty's Ministers and the Royal Commissioners for the Exhibition of 1851 will attend in the procession, and her Majesty's Commissioners for the Exhibition will invite the royal and distinguished persons at the head of the respective foreign commissions, and the foreign ambassadors and ministers accredited to this country, to take part in the ceremony.

II. Her Majesty's Commissioners will seek the co-operation of the Guarantors of the Exhibition, jurors, members of both Houses of Parliament, heads of the church, universities, law, army, navy, and volunteers, the municipalities, scientific and artistic institutions, the local and other committees aiding the Exhibition, &c., in giving to the state opening a national character. For such persons there will be a number of reserved seats, but the number is necessarily limited. Whilst desiring to meet the wishes of all, her Majesty's Commissioners must reserve to themselves full power of dealing with the arrangements according to their discretion. Her Majesty's Commissioners request that gentlemen occupying officially reserved seats will appear in uniform, official, or court dress.

III. The principal ceremonies will take place under the two domes and along the whole length of the nave. The official reception of her Majesty's representatives and of distinguished visitors taking part in the ceremonial, will be held in the central south court. The procession will start from this point and proceed to the west dome. Here will be a chair of state, and, after a verse of the National Anthem has been sung, an address will be received. The

procession will then move down the nave to the east dome, where the musical performances will take place, after which the procession will return to the throne at the west dome; a prayer will be offered by the Bishop of London, and the Hallelujah chorus and the National Anthem will be sung. The opening of the Exhibition will be declared by his Royal Highness the Duke of Cambridge. Military bands will be stationed in the south central court.

By order of her Majesty's Commissioners.

F. R. SANDFORD, Secretary.

International Exhibition, 28th March, 1862.

The Japanese Embassy, which has already reached Marseilles on its way to Paris, intends to be in London in time to be present at the opening ceremonial.

The following circular has been addressed to the exhibitors of machinery.

Exhibition Building, South Kensington, W., April 2.

SIR,—I am directed by her Majesty's Commissioners to request that you will at once employ such a number of workpeople to put together your machinery in the Exhibition as will ensure the whole of your works being completed before the 20th of April.

After that date it will only be permitted to complete the arrangements for fencing off the machinery, and to get all in readiness for the opening of the Exhibition on the 1st of May.

Machinery in motion will be allowed to be tried between the 22nd and 25th of April, and the connection between the steam-engines used as prime movers, and the main steam and exhaust pipes in the western annexe must be absolutely finished by the 15th of April.

I am, Sir, your obedient servant,

F. R. SANDFORD, Secretary.

SIXTEENTH ORDINARY MEETING.

WEDNESDAY, APRIL 2ND, 1862.

The Sixteenth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 2nd instant, George F. Wilson, Esq., F.R.S., Treasurer of the Society, in the chair.

The following candidates were proposed for election as members of the Society :—

Bremner, Samuel	{ "Belle Sauvage" Printing Works, Ludgate-hill, E.C.
Cave, Stephen, M.P.	35, Wilton-place, S.W.
Cocksedge, Henry Barry .	20, Bucklersbury, E.C.
Coxon, Benjamin Payne..	Warrington.
Crispe, James.....	4, Cheapside, E.C.
Donaldson, J. Hunter ...	176, Oxford-street, W.
Harris, Samuel J.	176, Oxford-street, W.
Head, Samuel Heath.....	{ 5, Martin's-lane, Cannon-st., E.C.
Potter, Thomas	44, South Molton-street, W.
Shrimpton, John	New Wanstead, N.E.
Spence, Peter	Manchester.

The following candidates were balloted for and duly elected members of the Society :—

Coles, Charles.....	{ 86, Great Tower-st., E.C., and The Firs, Mitcham, S.
Dawson, Henry	{ 16, Finsbury-pl. South, E.C.
Dovey, Wm. Thos.	{ 10, Cunningham-place, St. John's-wood, N.W., and 6, Crosby-square, E.C.
Houghton, James	{ 114 and 115, Tottenham- court-road, W.
Howe, Wm. Francis.....	{ 6, Newman's court, Cornhill, E.C., & 5, Lower Belgrave- street, Eaton-square, S.W.
Mackay, Thos. Miller ...	{ 24, Leinster-gardens, Hyde- park, W.
Marshall, Joseph Gilbert Blair.....	{ 7, Vicarage-terrace, Strat- ford, E.
Pearce, Wm. Peter	{ 66, Gresham House, Old Broad-street, E.C.
Preedy, J. K.....	{ 98, Gracechurch-street, E.C.
Purdy, William.....	{ 54, Old Broad-street, E.C.
Ward, Wm. George	{ Sherwood-rise, near Notting- ham.
Wood, Henry Thos.	{ 22, Watling-street, E.C.

The Paper read was—

ON THE INTRODUCTION AND USE OF ELASTIC GUMS AND ANALOGOUS SUBSTANCES.

By FREDERICK WALTON.

The leading feature of the paper I shall now have the honour of reading to you, and the one to which I wish more particularly to direct your attention, is the invention of a new substance analogous to the elastic and pliable gums, India-rubber and gutta-percha; not only in many of its properties, but also in the uses to which it can be applied, and for which uses no other materials of any real value have hitherto been found. In order that a fair idea may be formed, not only of the individual but of the relative value of the several substances comprised in this paper—in regard, more particularly, to their adaptation to the requirements of a progressive civilisation—it is proposed to treat the subject as follows:—

1st. The introduction, properties, and uses of India-rubber.

2nd. The introduction, properties, and uses of gutta-percha.

3rdly. The introduction, properties, and uses of the new substance, and an explanation of the manner in which it will be found a valuable addition to our present resources in materials of a like nature.

I have found it extremely difficult within the usual limits of a paper of this description to include even a small portion that is interesting and valuable in connection with our knowledge and experience of these materials. Condensed as it is, I hope, however, it will give a sufficient idea of the commercial importance of the materials described, and of their value in affording us a larger measure of convenience and comfort than we could otherwise enjoy.

“Caoutchouc,” or, as it is commonly named, “India-rubber,” was first introduced into Europe in the early part of the last century, but its origin was unknown until the visit of the French academicians to South America in the year 1715. They ascertained that it was extracted from a Brazilian tree, called by the natives *Hevea*. In 1767 a specimen was first brought to England, and was sent to Mr. Canton, by Sir Joseph Banks, as “two balls of the new elastic substance.” In 1772, Dr. Priestly thus speaks of the new discovery in his “Introduction to the Study of Perspective.” “I have seen a substance excellently adapted to the purpose of wiping from paper the marks of a blacklead pencil; it must be, therefore, of singular use to those who practice drawing. It is sold by Mr. Nairne, mathematical instrument maker, opposite the Exchange. He sells a cubical piece of half an inch for three shillings, and he says it will last for years.” This property of ob-

literating pencil marks first gave the name India-rubber, which it has held to this day. Naturally enough, so singular a material, and one so unlike in its nature to anything that had hitherto come before their notice, caused considerable interest amongst chemists and philosophers. Every conceivable experiment that the science of that day could suggest, was employed in the hopes of wresting from it those secrets with which nature sometimes favours earnest searchers after truth. Philosophy added some new facts to the stores of knowledge, but it remained for the practical utilitarian of the 19th century, aided by the appliances of a more advanced civilisation, viz., the rollers, masticators, and presses of a new mechanical era, to torture from it the secret of wealth, which lay dormant like its own latent heat.

There are many English weeds which, when pressed, yield a milky substance, as for instance, the common dandelion, garden spurz, poppy, &c. Humboldt, in the first edition of the “Aspects of Nature,” noticed that the milky juices of plants increase as we approach the tropics. There are, in the tropical climates of Asia, Africa, and America, a large number of trees and shrubs, which produce the liquid caoutchouc, and it is obtained by exudation through punctures made in the bark. About 12 years ago, Mr. Griffith published an interesting report upon the *Ficus elastica*, or india-rubber bearing tree of Assam. He says, “This remarkable species of fig-tree grows either solitary or in two or three field groups. It is larger and more unbrageous than any of the other trees in the forest where it abounds, and may be distinguished from them at a distance of several miles, by the picturesque appearance produced by its dense, huge, lofty crown. The main trunk of one was carefully measured, and was found to have a circumference of no less than 74 feet, or, including the supports immediately round it, 120 feet. The area covered by the expanded branches had a circumference of 610 feet. The height of the central tree was 100 feet.” It has been estimated, after an accurate survey, that there are 43,240 such noble trees within a length of 30 and a breadth of 8 miles of forest near Ferozepoor, in the district of Chaddar, in Assam. Lieut. Veitch has since discovered that the *Ficus elastica* is equally abundant in the district of Nanduar, and it is said this species extends over more than 10,000 square miles in Assam. Many other trees in various countries yield india-rubber, among which may be named, as the most fruitful, *Siphonia caoutchouc*, *Ureola elastica*, *Jatropha elastica*, *Castilleja elastica*, *Cecropia pelletia*, *Ficus religiosa*, &c. The *Siphonia caoutchouc* extends over a vast district in Central America, and the india-rubber obtained from this tree is one of the best adapted for manufactures. The *Ureola elastica* is a native of the islands of the Indian Archipelago. It is said this tree will yield from 50 to 60 lbs. of india-rubber in one season, without being injured by the drain of sap. India-rubber is thus derived from many countries in the tropics, each having its peculiar quality and value in the market.

Para, in South America, furnishes a very fine quality, much esteemed. There are, besides, East India (Penang and Siam), African (Lagos), Guatemala (Carthagena), Guayaquil, Assam (Daloore), Ceara, Barbadoes, and Mauritius. The principal imports, however, are from Para and the East Indies. The Para rubber is of very fine quality, and if not injured by masticatory processes in the manufacture, or mixed with deleterious compounds, will, under ordinary circumstances, preserve its character for an almost indefinite period, whilst the Ceara, a very inferior quality, often passes through a species of decomposition before arriving in this country, the heat of the ship's hold being sufficient to partially liquidate its substance.

The liquid india-rubber, as it exudes from the tree, is of a creamy appearance and consistency. Examined by the microscope, it is found that the particles of india-rubber are floating in the form of small globules, in a thin, watery, albuminous fluid, which, when evaporated, leaves

the india-rubber in a solid, elastic state. In this primal state, it would appear in the most eligible form for the waterproofing of fabrics, as it might then be precipitated, so to speak, on the cloth, and thereby be secured in its pure natural condition; and it seems long previous to its introduction into England that it was so used by the Spaniards. In 1723, a work, entitled "*La Monarchia Indiana*," was printed in Madrid, in which is described "very profitable trees in New Spain, from which there distil various liquors and resins." Amongst them is described a tree called *Ulquahuil*, which the natives cut with a hatchet to obtain the thick, white adhesive fluid. Of this they made balls, called *ulli*, which bound very high when struck to the ground, and were used in various games. He goes on to say, "Our people (the Spaniards) make use of their *ulli* to varnish their cloaks, made of hempen cloth, for wet weather, which are good to resist water, but not against the sun, by whose heat and rays the *ulli* is dissolved." India-rubber is known in Mexico to the present day by the name of *ulli*.

Many of the earliest experimentalists in india-rubber clung tenaciously to the idea of importing the liquid. Amongst them may be mentioned Mr. Chas. Hancock, the author of the work on india-rubber manufacture, and perhaps the most worthy to be called its originator as a manufacture. Although this idea seems practical enough at first sight, yet there are in reality difficulties and objections to it which have not yet been surmounted. The particles of india-rubber floating in the watery fluid have a most perverse way of uniting and forming lumps, or coagulating. Added to this difficulty is that of making secure vessels in a wild, savage country, and their safe transmission to the coast, independent of the extra cost of the carriage and freight of the additional liquid. An invention was patented in America for mixing some chemical with the caoutchouc to preserve the liquid condition, but I am not aware that india-rubber in this state is now anywhere employed as a manufacture.

The manner of collecting india-rubber is as follows:—A tribe or party of Indians set out in search. On finding trees they first make incisions about a foot apart, across and through the bark, round the trunk and large branches, the quantity which exudes increasing with the height of the incisions. Leaves to form vessels are placed at the foot of the tree to receive the milk which gradually streams from the wounded bark. The average quantity from full grown trees is about 40 to 50 lbs. at each bleeding; the bleeding may be repeated after the interval of a fortnight.

To reduce this milk into a state of solid india-rubber the natives make clay moulds of various shapes, the most common and usual being that of a circular bottle. When the clay is dry these moulds are dipped in a vessel containing the milk, and then hung in the smoke of a fire made with palm leaves and roots, the heat of which dissipates the watery fluid and leaves a thin film of india rubber on the mould. This alternate dipping and drying is repeated until the desired thickness has accumulated, which is usually from half to one inch. The dried clay forming the nucleus is then broken and extracted from the mouth of the bottle; though the native's conscience, possessing somewhat the elasticity of the material he operates on, overlooks sometimes this important part of the manufacture, much to the disgust of the English buyer who, perhaps, pays 1s. 6d. to 2s. per lb. for it. This is, however, a small return for the sized cottons, iron knives, axes, &c., and doctored whiskey too often palmed upon them by more civilized traders. The singular decomposition of india rubber, which, as before mentioned, in some cases occurs even during its passage home, has its origin, I feel assured, in the admixture of some deleterious matter during the process of solidification. The smallest portion of oleaginous matter would impregnate the mass and favour rapid subsequent decay. It is highly probable that the burning of oily vegetable matter in the fires employed for drying the layers may, under

certain circumstances, give off such oleaginous particles to the serious injury of the india rubber.

Caoutchouc is of the class of hydro-carbons. According to the analysis of Dr. Ure, it consists of 90 parts of carbon, and 10 parts hydrogen. Professor Faraday says it is 87.2 carbon and 12.8 hydrogen; unlike most vegetable products, it does not contain any oxygen. Some of its physical properties are very remarkable and highly interesting, amongst which is the production of heat attending compression and expansion.

Mr. Brockedon, in a paper read to the members of the Royal Institution "On some properties peculiar to india-rubber," states that he raised the temperature of an ounce of water two degrees in about 15 minutes by collecting the heat evolved by the extension of caoutchouc thread.

Its resistance to enormous pressure is very extraordinary. A cube of $2\frac{1}{2}$ inches, impactly secured, was subjected to a force of 200 tons. The result was a compression amounting to one-tenth. Great heat appeared to have been evolved, and the excessive elasticity of the substance caused a fly-wheel, weighing five tons, to recoil with alarming violence.

A further instance may be interesting, as regards its resistance to steady pressure. In preparing natural india-rubber (which I shall have occasion to explain more fully in the course of this paper), hydraulic pressure is employed. I have seen two bolts of $\frac{1}{4}$ inch best Low-Moor wrought-iron simultaneously torn asunder at the head, whilst the india-rubber contained under pressure has only expanded a few inches on being released from its tremendous load.

A series of experiments on the elasticity and other kindred properties of india-rubber, made under a variety of circumstances, having regard at the same time to relative phenomena, would, I feel sure, be not only eminently valuable to science, but probably open some chance of this peculiar and valuable property being imparted to other substances of a similar character, and thereby afford new and valuable materials for manufacture.

The electrical properties of india-rubber are very great, and when mixed with shellac and silica, or vulcanised into the horny state, it is an almost perfect electric, having high insulating qualities.

India-rubber may be dissolved in highly rectified ether and in some of the volatile essential oils, but none of these are valuable in its manufacture. Carefully rectified coal-naphtha is the most rapid solvent and the most easily evaporated of any, and on account of its moderate price is unrivalled. Highly rectified spirits of turpentine are also employed, but to no great extent. A very remarkable discovery was made in the year 1833, by Mr. W. Barnard, at the factory of Mr. Enderby, of Greenwich. Whilst experimenting on the impregnation of ropes with caoutchouc, he discovered that when that substance was exposed to a heat of 600° Fahr., in a retort, it was resolved into a white vapour, which by the usual method employed in distillation was condensable into a fluid having remarkable properties. In the first place, in a liquid state, it has a lighter specific gravity than any other liquid known to chemists, but in a state of vapour is heavier than the most ponderous gases. Indeed, so dense is it that it may be poured from one vessel to another like water. It has the power of dissolving india-rubber with great facility, and will dissolve copal without heat, a result never before obtained with any solvent.

As before mentioned, india-rubber was unknown, excepting as regarded its philosophical interest, until about the year 1820, when it first began to be looked upon as likely to become an important manufacture, though we find at an earlier date, in the year 1791, a patent for its use, taken out by Samuel Peak. His patent was entitled, "An improved method of making and rendering waterproof all kinds of leather, linen, cotton, &c., for the purpose of being worked up into shoes, boots, and other wearing apparel, and to be used on all occasions when dryness or a power of repelling moisture may be required." He proceeds to describe how he dissolves india-rubber by

distillation or infusion of spirits of turpentine over a brisk fire. It may be dissolved in other spirits, and in most kinds of oils, or the gum may be used with equal advantage in its native fluid state.

The next patent was that of Mr. Thomas Hancock, in 1820, for "An application of a certain material to various articles of dress and other articles, that the same may be rendered more elastic." This patent consisted in applying india-rubber to the manufacture of elastic bands for gloves, waitecoats, purses, &c., afterwards so increased in value by the invention of Mr. William Sievier, dated 1831 and 1833, for covering braiding, and weaving elastic threads, such as are now so largely consumed for elastic shoes and boots, braces, purses, bands, &c.

In 1823, Mr. Charles Macintosh took out a patent for "A process whereby the texture of hemp, flax, wool, cotton, &c., may be rendered impervious to water and air." He first describes the preparation of a varnish by dissolving india-rubber in the substance which is produced in making coal gas, commonly called coal oil. With this varnish or cement he combines two fabrics, which are thereby rendered air and waterproof. This was the origin of the famous waterproof coats; and the name of Macintosh is still employed to designate all combined waterproof fabrics. These coats will be remembered for the excessive odour they evolved, a consequence of the impure naphtha then employed, which contained a considerable amount of tar creosote, &c. This was a great source of annoyance, not only to the wearer but to the manufacturer, on account of the length of time the india-rubber solution required to dry, and the destructive action of these deleterious impurities thereon, involving active decomposition. These grave objections to the use of naphtha being brought to the notice of manufacturing chemists, a more highly-rectified spirit was soon produced.

We have now reached a point in the history of this material, when a few words, explanatory of the treatment of rubber in course of manufacture will be advantageous, as rendering more intelligible what will subsequently come under our consideration. Each manufacturer has some favourite plan of manipulation or peculiar arrangement of machinery, but all based on the same principle. For most of the purposes for which rubber is applicable, its peculiar intractability whilst in the solid natural state, prevents its manipulation into the desired forms until rendered more plastic and yielding; but solvents act very slowly on the natural substance, whilst in the form of block, lump, or bottle. The resistance to compression, we have previously noticed, is a barrier to the use of rolling mills, at least, as far as its reduction into a fine, even sheet is concerned. It was therefore found necessary to have recourse to some mechanical means, whereby the structure of the India-rubber might, as it were, be broken down, and its extraordinary cohesive power be temporarily overcome.

To the schoolboy of former days must we ascribe the discovery of a process whereby this might be accomplished. We, many of us, may remember the favourite amusement of some who, ever ready to beguile the lingering school hour, would render more attention to the production of a good India-rubber "pop" than to their Euclid or Virgil. Their process was the continued mastication of a piece of rubber, about a $\frac{1}{4}$ -inch cube, until it became so soft and plastic that, by pulling it into a thin membrane, and then folding it over edge to edge, an air cavity or bubble was formed, the air in which, exploding by pressure between the thumb nails, produced the crack or "pop" it was their delight to accomplish, and to which end they had perseveringly continued the mastication some two or three days, in spite of aching jaws. No one who would try the operation for a few minutes will deny that a prominent feature of English character is in early life developed by this determined and continued exercise of the school-boy's molar powers. This illustrates then the treatment necessary, as we before said, to overcome the great cohesive power. Machines, called "Masticators," were invented,

consisting of a cylinder of cast-iron, mounted on a suitable frame. A central shaft, armed with coarse teeth, revolves in it; there is a grated door in front, to fill or empty it. It will be perceived that when India-rubber is put into this cylinder, the revolving shaft will give it motion, and, by continual mastication by these powerful teeth, added to the heat with which the enormous friction is attended, it will be speedily reduced into a uniform homogeneous mass. Water is admitted into the cylinder to wash out any impurities in the rubber. It is then transferred into a dry masticator, and there worked longer, until all the moisture it contains is completely evaporated. Well-made and true rollers will then bring it down into a thin sheet, like paper, and it may be dissolved either into "varnish," or the more solid "dough," as it is called, by the digestion of the sheet in more or less naphtha, aided by mechanical friction, a very short time being necessary to do this after the structure of the India-rubber is so thoroughly altered.

In order to make a fabric impermeable to air or water, a machine called a "guage spreader" is employed. The cloth to be rendered proof is wound on a roller at one end of the machine; from this roller, after passing over straining bars, to preserve the cloth from creasing, as well as to secure a regular tension of the fabric, it passes over a truly-turned iron roller—having a guage or knife fixed above it, provided with screws to regulate the amount of varnish or dough it is desired to lay on the fabric—from this guage the cloth passes over and under a steam chest, whereby the naphtha is evaporated, and it is then rolled up. The cloth being disposed in the order described, and the knife adjusted to the desired guage, a quantity of the viscid varnish or dough is placed in front thereof, and the machine then set in motion. If a fine surface and a thick substance is required, several layers are put on in succession. If a double texture or macintosh cloth is desired, two fabrics are coated, and are, whilst in an adhesive state, united by passing them face to face between a pair of rollers, which produces a compound fabric, perfectly water and air proof.

Sometimes the India-rubber dough is spread by means of rollers having polished or smooth surfaces, by which a good effect may be produced in one operation, but from various causes it is not the most economical plan.

For moulded and vulcanised forms the dough is intimately combined with finely-divided sulphur in mixing rollers, and then put into moulds of the desired form, and exposed in a vulcanising oven to a heat of from 240 to 260 degrees Fahr., for a space of time varying with the size and purposes to which the materials are afterwards to be applied. Where hard compounds, called vulcanite, are desired, the heat is considerably increased, by which the process is carried a stage farther, and the India-rubber changed into a substance having all the appearance of horn or ebony, but having still considerable elasticity. The merit of the invention of India-rubber vulcanisation is due to Mr. Charles Goodyear, of the United States, who patented it there. It was afterwards patented in this country by Mr. Thomas Hancock, and Mr. Charles Goodyear was thus restrained from importing his vulcanised India-rubber into England. This very important improvement, whereby rubber was rendered almost unaffected by change of temperature, insoluble, and less susceptible of injury from contact with oil or grease, gave considerable impulse to the application of this substance.

The extensive and varied uses to which India-rubber is now applied, furnish a striking example of the shortness of our mental vision in perceiving, even faintly, the destiny of new discoveries, for no individual appears at its introduction to have possessed the prescience of its future importance.

It is impossible for the ordinary observer to appreciate fully the advantages derived in additional comfort and convenience from this simple substance, unless by inquiring into the various and multitudinous applications which represent its utility. The metamorphoses it under-

goes in the hands of man, when subjected to his skill and ingenuity, would be something marvellous in any other times than the present era of steam and electricity. Derived from the milk of a tree, it comes to us as a shapeless lump; but the Hancocks, Macintoshes, and Warnes—genii of the gum—so mould and fashion it to their will, that it issues from the manufactory—to suckle our children—to ward off the severity and sharpness of our climate—to relieve the pains and suffering of disease—and, when old age brings on us the loss of our most estimable instruments, the teeth, it furnishes the means of replacing them.

A large amount of practical knowledge and scientific research has been directed to this manufacture, and the results have proved eminently creditable to those engaged therein. Foremost amongst these workers may fairly be ranked Mr. Thomas Hancock, to whom the manufacture mainly owes its origin and development; but there is besides a long string of names of those who have rendered valuable service—Goodyear, Parkes, Brockedon, Sievier, Keene, Macintosh, Nicolls, Woodcock, Jaques, Fanshaw, &c., have each given their meed of intelligence and ingenuity.

In describing the uses of india-rubber, they will be taken in the following order:—

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|------------------------|----------------------------|
| 1. Domestic uses. | 3. Surgical and Dentistry. |
| 2. Manufacturing uses. | 4. Miscellaneous. |

First, then, in Domestic uses:—We have a door-mat, not long ago introduced by Messrs. Warne and Co., of Tottenham, but which is in considerable favour, judging from the number to be seen in use. It is formed of strips of vulcanised india-rubber, cemented endways in a honey-comb pattern, the extreme elasticity of the ribs serving to remove the dirt very effectively, and allowing it to drop into the bottom of the mat, to be easily removed at any time.

A manner of making floor-cloth was patented by Elijah Galloway, in 1844; it consisted of combining india-rubber with a large amount of cork, and then rolling it into a substance about one-eighth to three-sixteenths of an inch thick, which may be printed with oil paint by the ordinary floor-cloth printing blocks. This material was called *Kamptulicon*, and has increased in public favour so much that there is now a considerable demand for it. Its qualities are, noiselessness when trod upon, rendering it admirably adapted for churches, banks, nurseries, libraries, billiard-rooms, or any place where quietness is desirable. Its resistance to wear and damp make it much more durable than oilcloth.

For closing doors, india-rubber springs act noiselessly and easily. Slips of india-rubber, cemented on the edges of doors and windows, exclude air and prevent draughts, as well as causing doors to close without noise or jar.

The beautiful mosaic wool hearth-rugs, manufactured by Messrs. Crossley and Sons, of Halifax, are produced by an ingenious process, which shows the value of india-rubber as a cement. Threads of coloured wool are disposed in a large frame, or box, in such order, that when a section is shown it shall represent some design that is being copied. The frame being filled, it is consolidated by pressure, and by means of a large semicircular knife a sectional slice is cut off to straighten the block; a sheet of linen, the size of the block, and uniformly besmeared with india-rubber cement or varnish, is then pressed against the face of the block of wool, until it adheres firmly to it; the action of cutting a thickness of the wool sufficient to form a rug pile, is then repeated, until the block is all cut up; the rugs are afterwards submitted to pressure to ensure secure adhesion. This cement will hold the wool as firm as if woven into the foundation.

Mr. Charles Goodyear introduced furniture veneers made of vulcanite, in imitation of ebony. A series of examples of vulcanite veneered furniture may be seen at the Crystal Palace, Sydenham, in Mr. Goodyear's court, with many other applications of it, such as buttons, knife

handles, &c. Mattresses made of air and waterproof fabrics, and inflated with air or water, as made by Messrs. Ayckbourn and others, often afford relief to the aching limbs of long bed-ridden invalids when other mattresses are painful. Waterproof coats and capes, although not considered wholesome to be worn for long, especially if made close fitting, are extremely valuable to those whose avocations expose them much to our extremely changeable climate. Bags made of waterproofed silks are largely used as sponge bags, and also bathing caps. The mother can bear testimony to the value of nursing aprons, feeding-bottles, gum-rings, and many other little appliances which render valuable service in the nursery.

In the kitchen we have a very useful application of the combined india-rubber and cork, before mentioned, called Oakey's patent knife-board, being a sheet of *kamptulicon* cemented on wood. It is extremely efficacious; being elastic, it yields to the knife, admitting the production of a high polish without scratches.

Flexible india rubber tubes, for the conveyance of water, are most valuable appliances for the bath-room, stable, or garden. Hard india rubber or vulcanite, possessing great hardness, durability, and capacity for taking and preserving a fine polish, forms a very suitable material for small articles or toilet requisites. Tooth, hair, and nail brush handles are made of it, in imitation of plain or carved ebony, admitting of the finest finish; combs also, having the appearance of horn, with perhaps more durability and elasticity, have been largely manufactured in Paris. Some of these combs are remarkable for the great amount of electricity generated by the friction of the hair whilst combing it; so considerable is the amount with certain individuals, when using a comb in my possession, that the action may not only be felt but a regular succession of slight discharges may be distinctly heard. It is this property which renders vulcanite one of the most valuable electrics we possess; and there can be no doubt that for electric telegraph cables, if, in addition to hardness, it could possess sufficient pliability, it would be the most perfect material we have, provided always that its manipulation was as facile. As supports or insulators for overhead telegraph wires, Messrs. Silver and Co. have been making, for some time, ebonite insulators.

Vulcanite and ebonite are moulded into knife-handles, either plain and polished, or in ornamental design, and in imitation of buck horn. Most beautiful buttons, with the finest lines and impressions imaginable, are made largely by india-rubber manufacturers in Paris.

Book-backs, paper-knives, pencil-cases, bobbins, needle-cases, bracelets, chains, crosses, rings, &c., are moulded of this material and then polished, the bracelets, &c., being a perfect imitation of jet. A most interesting example of its uniformly resilient property is its application to the cushions of billiard tables.

2ndly, its uses in manufactures. These are very numerous and important. Driving bands, formerly made exclusively of leather, are now made largely in india-rubber, which, in addition to their qualities of working equally well in damp or dry rooms, outside or in, are lower in price considerably. They are made by combining layers of cotton or linen cloths by india rubber cements, and then coating the surface with finishing material and vulcanizing them in moulds. The North British Rubber Company, of Edinburgh, have almost the monopoly of this strapping, having machinery specially adapted for every process in the manufacture.

Hose pipes, for conveying water, beer, or other liquid from one vessel to another, or for extinguishing fires, are durable and considerably cheaper than the old-fashioned rivetted leather hose.

Packings for the joints between steam, water, and air pipes, consisting of vulcanised india-rubber rings or alternate layers of cloth and rubber, have almost entirely superseded the old packings of pasteboard, hemp, and white-lead, on account mainly of the economy of time and labour, and more certain success attained thereby. The

elasticity of these packings permits the rough unturned flanges of two steam pipes to be made perfectly steam tight without the more expensive operation of facing the pipes in the lathe. Valve and piston packings are also much used. Perhaps the most philosophical application of india-rubber to manufactures is that of Mons. Perreux's valve, which may be advanced as an example of the valuable ideas that inventors and manufacturers may derive from a careful and earnest study of the economy of nature. This valve, formed entirely of vulcanized india-rubber, is an imitation of valves found in the human body. It is formed of two powerful projecting lips, described in the patent as resembling the mouthpiece of the musical instrument called the *hautboy*, which are fitted in a pipe. The water flowing in one direction opens them with the slightest pressure, but when the current of water reverses, it closes the lips instantaneously, and they will not permit the water to return. The action of this valve is very perfect, and it may be worked in water containing bits of wood, cinders, &c., as the valve mouths, being perfectly elastic, will close upon them without any leakage, and free themselves the moment the pressure is reversed.

In the ingenious envelope-machine invented by Messrs. De la Rue and Hill, one of the most effective and necessary appendages is a bit of burnt india-rubber. This material, when burnt on the surface, retains considerable adhesiveness for months, and will adhere to any light substance pressed against it. It can easily be imagined that considerable difficulty would arise in inventing mechanical instruments or fingers to lift up and transfer these envelopes from one part of the machine to another. Levers are made with a lifting and transferring motion, armed at their extremities with bits of burnt rubber. The action is similar, of course, to that of lifting wafers by wetting the fingers to cause momentary adhesion. This arrangement fulfils everything required of it.

Cards (or wire brushes, as they may be termed) used for carding wool and other fibrous substances, as well as now employed for raising the nap upon woollen cloth prior to shearing, and for producing certain kinds of finish, are also made with rubber. These were formerly made of leather, in which were set the wire staples, dents, or teeth, which in the process of carding disentangle and straighten the fibres. In order to increase the elasticity of the foundation wherein these wires were set, my father, Mr. James Walton, of Haughton Dale, near Manchester, patented, in 1834, the application of sheet india-rubber cemented to linen and cotton fabrics, for the backs or foundation of cards, the success of which has been so great, that the india-rubber has now almost entirely replaced the leather for this purpose. Finding, shortly after the commencement of this new manufacture, that the process of mastication of rubber was highly injurious, where it had to be used afterwards in warm temperatures, he invented a series of machines whereby the rubber may be produced in an almost endless sheet, without any mixing, masticating, or rolling process, and preserved throughout in the same pure, natural condition and structure as imported. This is effected as follows:—The india-rubber is cut up by a machine into fine mince-meat. It then passes through a washing and purifying process, and is afterwards submitted to a strong dry heat, by which means all moisture is evaporated, and in a few hours an adhesive character is given to every surface of the particles. It is then placed in extremely powerful hydraulic presses, and pressed into a solid circular block, or cylinder, about 50 inches long and 36 in diameter, with a hole through the centre, in which a shaft is forced. This shaft, having centres, can be placed in a cutting machine, and by it the block of india-rubber can be cut into a continuous equal sheet of pure natural rubber, which, from the different colours of the pieces of india-rubber composing it, has the appearance of a piece of brawn. This sheet of natural india-rubber is then cemented to cotton and linen fabrics, which give strength to resist great strain during work. Whilst on the subject of this application, it will, I think,

be interesting to diverge a moment to a sketch of the machines employed in setting the wires into the india-rubber foundation, which is allowed generally to be one of the most perfect automatic mechanisms known, more particularly in regard to the wonderful speed and precision of its movements.

This machine, as first employed for setting cards, was introduced by Mr. Chas. Dyer, but was slow and cumbersome. My father invented an improved machine, which, although only about two feet square, is composed of 338 distinct parts, forming instruments for 12 different movements. This machine sets 240 dents or teeth per minute. For each tooth set it has to draw forward the wire, to cut it into lengths, to bend it to the form of a staple, to prick the hole in the india-rubber, to insert the staple therein, and afterwards to bend the staple or tooth behind, besides many auxiliary movements, such as a stop motion to stop the machine instantly, if any defect in the wire arises. At our mill at Haughton Dale there are 450 of these machines, besides all the wire, india-rubber, and cloth factories. In one room are 189 machines, which cut and set 45,360 teeth every minute, consuming in this one room every year above 128,000 miles of wire. The consumption of rubber in our mills alone for card making is usually about 2½ tons per week.

But to proceed with our uses of india-rubber. We next notice its application to drawing rollers of spinning frames for cotton spinning, instead of leather; but, partly on account of an electrical action, which excites and attracts the fibres, it never succeeded. We have then cotton felt, cemented into sheets (according to Clarke's patent) with india-rubber, used largely as a waterproof wrapper for packing Manchester and other goods. This felt, coloured with pigment, varnished, and embossed, makes a good imitation leather for book-binding, for purses, &c., as patented by Fitch. Paper and cloth are also combined with india-rubber cement, as described in a patent of my own for imitation leather.

Shuttles for weaving, valve-boxes for acid pumps, and pipes and buckets for acid manufactories, are made of vulcanite. In manufactories where corrosive acids are, this material is valuable from its resistance to the corrosive action of such liquids. Hydraulic ram leathers have been tried, but with indifferent success.

Gas holders for gas works have been made and sent abroad. India-rubber combined with shellac forms the celebrated marine glue, so much used in ship-building for uniting masts, by gluing the splices with this cement, and which is so tenacious as to hold the splices so firmly that it has been repeatedly proved that the mast will break at any other point than the joint.

3rdly, we take Surgery and Dentistry. Here it is largely used; mostly in the hard state for knife, saw, and lancet handles, caustic holders, syringes, stethoscopes, and many other valuable appliances, the smooth and polished surfaces obtained on these articles, allowing them to be easily cleaned. Dissecting gloves of vulcanised india-rubber are valuable to the anatomist for the protection of the hands from any putrid poisonous matter.

Elastic stockings, for the cure of varicose veins, &c., waterproof sheets and bandages, truss-pads, air and water cushions, are all useful in the hospital and surgery. Flesh vulcanised rubber, coloured to imitate the gums, is now largely prepared by the manufacturers and supplied to the dentists, who, taking a mould of the mouth in wax, remodel it in plaster of Paris. This is then dried, and the artificial teeth inserted in the cavities, and the gum-coloured rubber is pressed into the mould until well fitted. An iron frame is then secured round the whole, and it is placed in a small vulcaniser, heated by gas, and provided with a thermometer, and then undergoes the necessary amount of vulcanisation to change it into a hard substance like ivory, but of the requisite colour just named. It is cleaned and polished, and is then ready for use. Artificial palates are also thus made, and dentists can attest nu-

merous cases where much suffering and inconvenience has thereby been alleviated.

4thly. In Miscellaneous Uses we have cricketing gloves, foot-balls, children's balloons, horse knee-caps, greyhound stockings, noiseless truck and carriage wheels, sheep stockings (to prevent rot), buffers for the horns of dangerous cattle, waterproof mail bags, to preserve letters from the effects of wet and moisture; tobacco-pouches, so much prized by smokers for the moist state in which they keep the tobacco.

Thus I have completed my list of the uses of this material, but there still remain very many valuable applications not noticed here. The examples given will sufficiently convey to you how important a branch of manufacture this has become.

The statistics that I will now submit to you will show the production of Para rubber; the imports into Liverpool; stocks in London; and the average maximum and minimum price during several years. Although statistics on this subject are not procurable for many years back, the following are to be depended on as from good authority:—

Production of Para rubber in—

1853	1,800 tons.
1854	1,926 "
1855	2,400 "
1856	1,900 "
1857	2,066 "
1858	1,700 "
1859	1,807 "
1860 and 1861	No record.

The imports into Liverpool from 1858 to 1861 are as follows:—

1858	428 tons.
1859	696 "
1860	1,065 "
1861	1,423 "

The stocks in London in—

1857	775 "
1858	719 "
1859	326 "
1860	192½ "
1861	399½ "
1862	715½ "

Maximum price of Para rubber in—

1856.	1857.	1858.	1859.	1860.	1861.
1s. 11d.	1s. 11d.	1s. 9½d.	2s. 6½d.	3s. 0d.	2s. 2d.

Minimum—

1s. 5d.	1s. 6d.	1s. 6d.	1s. 11d.	1s. 3d.	1s. 9d.
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As far as can be judged, the demand in this country has been regularly and rapidly increasing; the production, on the contrary, does not increase in proportion. In the year 1835, the price of rubber was about 6d. to 8d. per lb. for fine quality; the same quality in 1860 was 3s.; in 1861, 2s. 2d., and now about 1s. 11d. to 2s. The price every year appears likely, from the recent quotations, to increase rather than otherwise.

GUTTA-PERCHA. This article was almost entirely unknown to commerce, even by name, as late as the year 1844, although it is said to have been brought to England in the days of Tradescant, "king's gardener" to Charles the First; and it is believed to have been shown in Tradescant's Museum, under the name of Mazer wood, of which bowls and goblets were formerly made. Subsequently it was often brought from China and other parts of the East, in the form of elastic whips, sticks, &c.

Gutta-percha is obtained from the *Isonandra Gutta* tree, of the order *Sapotaceæ*, or gum-exuding *genera*. The discovery of gutta-percha, as a substance of commercial value, is due to Dr. Montgomery, an assistant surgeon of the Residency of Singapore. Whilst one day watching a penang, or native woodcutter, at his labour, he was struck by the appearance of a hatchet or chopper which he

employed. The handle seemed to be formed of some material very different from those he had before seen. On questioning the man, he found that the material of which it was made could be moulded into any form, by dipping it into boiling water till it was heated through, when it became plastic as clay, regaining, when cold, its original hardness and rigidity. Seeing the importance of a substance possessing such properties, he first ascertained how it was procured, and finding it to be derived, like caoutchouc, from an inspissated juice, he then procured specimens in various stages of preparation, and sent them to the Society of Arts in London; for this discovery of a new substance valuable to the Arts and Manufactures they afterwards presented him with the Society's gold medal. As the natural history and manner of collecting this gum has been so often described in the journals of this and other societies, and as the introduction to public use and notice is in a great measure due to the publicity thus given, it would be presumptuous on my part to give more than the preceding sketch thereof.

Mr. Chas. Hancock, in his patent of 1846, claimed the application of gutta percha to a large number of purposes for which it had never been before employed; and to his exertions, and the enterprise of the Gutta Percha Company, is the development of its manufacture and applications mainly due.

The manufacture of gutta percha requires a series of cleansing, kneading, and moulding machines, for the crude lumps as imported contain large quantities of foreign matter, such as bark, stones, &c. To effect a separation of extraneous substances, the rough blocks are first cut into slices, by a vertical wheel, faced with knives, making 200 revolutions per minute. The slices are then sorted over, and any gross matters removed, and after boiling in water the doughy mass is put into an iron box, or tearer, in which an iron cylinder, with iron teeth, rapidly revolves tearing it into shreds, and then throwing it into cold water. There the gutta percha floats on the top whilst the impurities sink to the bottom. It is then transferred to tanks of boiling water, and afterwards put into masticators, to be kneaded into a dry uniform dough. If it is desired to make this dough into sheet for shoe soles, driving bands, &c., it is rolled out between smooth rollers to the desired gauge or thickness. In making tubes and pipes the dough is put into cylinders furnished with pistons, and having a die at one end of the cylinder, through which the gutta percha is forced in a continuous length of finished pipe. There are two cylinders to each moulding machine, so arranged that one can be charged with the dough whilst the other is discharging through the die—thus obviating the necessity of stoppages. In coating telegraph wires a very similar disposition of machinery is employed, the wire to be covered being passed through a die sufficiently large to allow the layer of gutta percha to be kneaded or moulded upon it, in its passage through the cylinder, guides being employed to preserve it as near as possible in the centre of the coating. To ensure a perfectly solid and impermeable coating, which shall be proof to the greatest weight of water which it can be exposed to, when used for deep sea cables, several successive layers are moulded over each other, the chance of any air-bubbles or defective places occurring several times in the same place amounting almost to an impossibility. The wires thus coated are then submitted to a very searching test, whereby the slightest fault is made visible. This admirable system of testing telegraph cables is the invention of Mr. Wm. Reid, telegraph engineer, who has applied an ingenious arrangement, whereby delicate electrometers can be made to indicate any defective point in a cable whilst under a pressure of many thousand pounds per square inch.

The capability of taking any form given to it whilst in the plastic state, renders the use of presses, dies, and models very valuable in its manufacture, especially in ornamental work. It will suffice, in describing its uses,

to read a list issued by the Gutta-Percha Company in their circular of 1850, which will show how varied are the applications it is capable of. It is true many of the uses here stated have not succeeded as well as sanguine promoters anticipated, still there have since arisen many valuable additional applications, which, in some measure, compensate.

The Gutta Percha Company's list, as before mentioned, is as follows:—

Domestic uses.—Soles for boots and shoes, lining for cisterns, picture frames, looking glass frames, ornamental mouldings, bowls, drinking cups, jars, soap-dishes, ornamental inkstands, vases, noiseless curtain rings, card, fruit, pin and pen trays, window-blind cord, clothes line, imitation fringe, coloured materials for amateur moulding, ornamental flower stand and pots, sheeting for damp walls and floors, conveyance of water, gas, &c., drain and soil pipes, tubing in lieu of bells, tubing for watering gardens, washing windows, &c., lining for bonnets, jar-covers, sponge-bags, watch-stands, foot-baths, lighter-stands.

Manufacturing uses.—Mill-bands, pump-buckets, valves, clacks, felt edging for paper makers, bosses for woollen manufacturers, flax-holders, shuttle beds for looms, washers, bowls for goldsmiths, bobbins, covers for rollers, round bands and cords, breasts for water-wheels.

Surgical uses.—Splints, thin sheets for bandages, stethoscopes, ear-trumpets, balsam for cuts, bed-straps, thread, bed-pans for invalids.

Electrical and Chemical.—Covering for electric-telegraph wires, insulating stools, battery cells, handles for discharging-rods, electrotypes moulds, carboys, vessels for acids, syphons, tubing for conveying oils, alkalies, &c., flasks, bottles, lining for tanks, funnels.

Uses on Ship Board, &c.—Sou' wester hats, life buoys, buckets, pump buckets, hand speaking-trumpets, drinking cups, powder flasks, fishing-net floats, sheathing for ships, water-proof canvass, air-tight life-boat cells, tubes for pumping water, round cords, lining for boxes, speaking tubes.

Ornamental Applications.—Medallions, brackets, cornices, console tables, an endless variety of mouldings in imitation of woods, for the decoration of rooms, cabinets, &c., picture frames.

Agricultural Purposes.—Tubing for conveying liquid manure, lining for tanks, driving bands, &c., traces, whips.

Office Uses, &c.—Inkstands, ink cups, pen trays, cash bowls, washing basins, speaking tubes, book covers.

Miscellaneous.—Suction and delivery pipes for fire engines, fire and stable buckets, linings for coffins, tap ferules, communion trays, ventilating tubes, hearing apparatus in churches for deaf persons, cricket balls, portmanteaus, police staves, life preservers, embossed book backs, embossed globes and maps for the blind, railway conversation tubes, miners' caps, lids for paper-cutting machines, skate bottoms, &c.

At the present time the most valuable application of gutta-percha is undoubtedly that of telegraph wire insulation. Its easy manipulation and high insulating property render it peculiarly applicable to this purpose, but its liability to soften at comparatively low temperatures is a very objectionable defect, which it is most desirable to obviate.

Gutta-percha tubing it is said, will resist a pressure of 500lbs. to the square inch.

Its acoustic properties are also very extraordinary, which makes it well adapted for speaking tubes. Its resistance to the action of corrosive liquids makes it very valuable for vessels and instruments employed in acid works. Enough might be said of the properties and uses of this material to occupy a large volume, but I must refer you to the numerous publications on the subject, written by those who are more acquainted than myself with its advantages, and would take this opportunity of saying, I should gladly, had it been possible, have referred more

specifically to the names of many who have lent their valuable aid to the development of the uses and applications of india-rubber and gutta-percha.

Having reviewed the introduction and uses of india-rubber and gutta-percha, it remains for me to present to your notice the new substance and its treatment, referred to at the commencement of this paper as its leading feature; and I believe, making due allowance for the usual sanguine temperament of inventors, I shall be enabled to place before you such particulars in relation to my discovery as will convince you of its value, scientifically and commercially, and that you have not conferred so much kind and patient attention on an unworthy subject.

Numberless attempts have been made to produce a material possessing the qualities of India-rubber, and this material, together with gutta-percha, has been distorted into all forms, and has been compounded, in a most heterogeneous manner, by a host of experimentalists seeking to produce a cheaper material, but no valuable results have been arrived at. The cheapest base for experiment had, I humbly submit, been neglected. It is well-known that linseed nut and poppy oils possess that nature, which distinguishes them from lubricating oils, of becoming concrete on exposure to the atmosphere; that is, that when spread in a thin layer on a surface of wood or iron, they dry or change into a thin skin. This change, which is erroneously called drying, is produced by the absorption of oxygen and the disengagement of carbonic acid, and is, in reality, only a change of their elementary constitution.

This property of absorbing oxygen rapidly is not considerable in the crude or raw linseed oil, but it is very greatly increased by boiling the oil, that is, exposing a large quantity of raw oil to a strong heat in a cauldron, with a small per-centage of metallic oxide of lead added. It is then called "varnish," and has a more viscid character, and is also rather more highly coloured. A layer of this oil requires from 6 to 24 hours to dry or change into a skin-like substance, according as the state of the atmosphere is more or less favourable.

I cannot do better than give to you a detailed account of the circumstances which combined to bring this subject before my notice. Whilst engaged, about two years ago, in a series of experiments on the manufacture of artificial leather, it was of the greatest importance to the success of the material that it should have a coat of fine varnish, which, whilst drying quickly, possessed the flexibility of india rubber. Copal varnish has always been accounted the best varnish, but made with drying oil combined with gum copal at a high temperature, it will not, of course, be dry until the action of oxidation has reduced the oil contained therein into a solid film. Whilst revolving in my mind this knotty difficulty, and presenting every phase of it to careful thought, it suddenly occurred to me that if the oil was first dried into a skin, like those I had often seen on paint cans, but, like other people, had before considered as waste, was dissolved in a volatile solvent, like India-rubber sheet—that the semi-resinous material would immediately on the evaporation of the solvent, resume, like India-rubber, the form it was in prior to solution. By dipping panes of glass into linseed oil, and allowing the films or layers to dry, then repeating the process, I initiated the manufacture of India-rubber from the milk, and thereby produced a solid elastic substance, composed of many layers of perfectly oxidised oil. Up to this stage I had done nothing new or original, for the oil sheet manufacturers have for more than a century waterproofed linen by layers of oil. But to treat this semi-resinous matter and render it available to purposes of manufacture, will be admitted to be perfectly new, and I now proceed to describe the invention. Having accumulated a quantity of solid oxidized oil by drying it upon extensive surfaces of any kind, such as prepared cloth, stretched in frames, as described in my patent of the 27th January, 1860, I then scraped or peeled it off by suitable means.

At first, as before stated, my attention was solely directed to the attainment of a speedily-drying, flexible

varnish at a moderate temperature, but very few experiments with this oxidised oil led me to notice its rubber-like qualities, which I at once conceived might, with further manipulation, and with some combinations, be developed more fully, and become a very valuable substitute for that article.

Encouraged by success at every step, I proceeded, and soon found that by crushing the solid oxidised oil obtained in sheets as described in my patent, and working it thoroughly in hot mixing rolls, I produced a substance which required only the cohesive nature, which in the early part of this paper we noticed as existing so strongly in india-rubber. The addition of a small proportion of shellac soon gave that which was wanting, and I found in my power a material singularly like caoutchouc when worked into dough, and which could be rolled on to fabrics in the same manner and with the same facility—giving a perfect waterproof cloth, unlike oil cloth, but having the rubber finish and flexibility. Pigments could easily be added to give colour; the addition of resins gave other, or rather varied proportions of adhesion, useful as affording the means of uniting fabrics as by rubber. Fibre, whether flock or cork, mixed in and rolled into sheets, gave me samples of kamptulicon and other floor-cloths.

These experiments were made more than two years since, and some of my earliest samples are now on the table before you—together with many of more recent date which I have yet to refer to; and beside them you have similar productions in rubber, which will enable you to make a comparison. Although I had thus accomplished more than my first anticipations, my primary object was yet unrealized, and I had, day by day, proofs of how entirely I was dealing with a substance of which the characteristics were entirely unknown to us. Various were the solvents tried to dissolve it. Obtained from oil it was unaffected by oil; no longer did it retain any unctuous matter, one of the greatest proofs practically of which is, that whilst any oil or greasy matter will destroy india-rubber very speedily, yet they have no effect on this; the two may be well combined. For a long time was I baffled in every attempt to find a solvent. Any heat short of carbonising it had no effect on the material, and here was evident a great advantage over rubber for practical purposes, if other desiderata were accomplished. At length I was able to dissolve this converted oil in alcohol and wood spirit—thus did I obtain the first varnish. Sufficient success had thus attended my labours to justify, at any rate in my own, perhaps sanguine mind, my patenting the discovery in England, France, Belgium, and America, and taking and fitting up works for the production of the material. But yet much remained to be achieved; the process was slow, the solvents were expensive, and did not offer all that was desired in the way of varnish. It was also desirable to obtain a medium state answering to the india-rubber cement or dough capable of being worked by the guage spreader which I have this evening described to you, and in which it would dry as rapidly, that is, within a few minutes of its passing the machine, this last requisition creating no small part of the difficulty. Some months more of diligent experiment led to more definite results, and at length I was enabled, by experiments which involved much time and labour, to perfect the solution in the distillates of coal, preferring the usual rubber solvent, naphtha. Thus was the material brought still further into a state so nearly resembling rubber solution, or cement, that even those most accustomed to the manufacture thereof could not distinguish one from the other, and in all respects it could be treated in the same way. Samples of the varnish, of the cement, and of the dough, I have also the pleasure to present to your notice. I would here remark that the success of this discovery is mainly due to the perseverance of my partner, Mr. Richard Beard, junr., who, with the same energy he devotes to the business department of our works, more especially under his care, has rendered me great assistance in these and later experiments.

Not only has this singular product been thus assimilated to rubber for uses on fabrics, or combined with fibre for floor cloths, but, still more strange, it is capable of being worked with pigment and vulcanised exactly as india-rubber has been described to be, and forms a hard compound like vulcanite and ebonite, excepting that the sulphur is not necessary. Pieces thus hardened are also placed on the table before you.

Having now explained the means of obtaining, treating, and applying this oxidised oil—its wonderful similarity to rubber must, I think, be apparent to all. I then submit that the process of solidification of the oil is identical with the drying and solidification of the rubber on the clay moulds I have in this paper referred to, with this difference, that with the rubber it is an evaporation of the fluid which holds the particles in suspension, in order that they may coalesce, and thus, of course, there is a loss of weight, whereas with the oil there is an increase of weight (ascertained by accurate experiments) from the absorption of oxygen. Chevreul confirms this point in his researches on oil painting.

The applications of my prepared oxydised oil are not limited to its uses as a substitute for rubber, as will be seen by the following list, but before passing on to its other applications, we will notice its advantages over rubber. 1st. The great difference in price which must ever exist from the facility with which one can be produced in the natural state over the other, for abundant as are the various trees yielding caoutchouc, the difficulty of collection, and scarcity of labour in regard to quantity obtained, must always keep up the price of natural rubber, whilst the linseed from which the oil is obtained can be so easily and cheaply cultivated.

The import of linseed in—

	Qrs.		Tons.
1858	1,017,844	equal to tons of oil about...	50,900
		Of which were exported ...	26,000
		Leaving for home use.....	24,900
1859	1,270,911	equal to tons of oil about...	63,600
		Of which were exported ...	30,000
		Leaving for home use	33,600
1860	1,330,623	equal to tons of oil about...	66,500
		Of which were exported ..	37,000
		Leaving for home use	29,500
1861	1,160,270	equal to tons of oil about...	58,000
		Of which were exported ...	32,000
		Leaving for home use	26,000

2nd. That being unaffected by oil or grease it is more durable than rubber in many of its applications, especially where used in various manufactures, such as cards for carding wool, printers' blankets, &c. That also for purposes where rubber is injured by temperature, this is unaffected. And last, though not least, its durability, inasmuch as it is free from those elements of decomposition which, it is admitted, are set in action by the very process that it is necessary for the rubber to undergo in course of manufacture, not to notice the numerous combinations therewith in use, in too many instances, on account of the high price of the pure material.

LIST OF APPLICATIONS.

Surface Fabrics.—Clothing, carriage aprons, cart sheets, sail covers, bath sheets, nursing aprons, sponge bags, &c.

Imitation Leathers.—Carriage lining, chair covers, boot and shoe leathers, trunk covers, saddlery, bags, reticules, &c.

Common Surface Fabrics.—Packing cloths and papers, cart-sheeting, tarpauling, brattice cloths for collieries, &c.

Double Textures.—Clothing, mail bags, hospital sheet-

ing, card cloths, printers' blankets, water and air beds, cushions, &c.

Manufacturing Purposes.—Packing for steam, water, and gas pipes, valves, machine banding, hose-pipes, tubing for carrying beer, &c., flax-spinners' bosses, calendering and embossing bowls, cop tubes, telegraph supports, or insulators, tank linings, ship sheathing, roof coverings, shoe soles, &c.

Hard Compounds (of any colour).—Knife and fork handles, surgical instrument handles, surgical and dental appliances, tubing for chemical vessels, picture frames, trays, mouldings, furniture ornamentation, panelling, veneers to imitate marble, ivory, ebony, and other woods, &c.

Miscellaneous.—Washable felt carpets, kamptulicon (of any colour) stair coverings, toilet mats, table covers, &c.

Flexible quick-drying varnishes. Paints for carriages. Painting or printing floor-cloth, table-cloth, &c. (will dry in a few minutes), enamels, of any colour, for enamelling papier maché, metals, &c.

We now pass to the advantages to be derived in the use of the material under consideration, for some of the purposes in the foregoing list, to which boiled oil has hitherto been applied; and first we notice the important article of leather-cloth, commonly called American leather-cloth. This is prepared by coating the fabric with oil boiled to a thick consistency, mixed with black pigment. This is spread on cotton fabrics, which is placed in a temperature of, say from 120 to 150 degrees, for a day, to dry or oxidize the oil coating. For convenience of hanging, these are in twelve-yard lengths, and this operation has to be repeated for five or six successive days, according to the thickness of the coating required, and lastly, in the same manner, a coat of copal varnish is given, each of these requiring the same length of time to dry. Thus seven to eight days are requisite to prepare the cloth for the embossing rollers. By the use of oxidized oil, properly prepared, you have all the same qualities as are obtained by allowing the oil to oxidize on the surface of the cloth, avoiding the consumption of so much heat and time, as well as injury to the fabric itself—with the advantage of being able to spread each coat successively, the solvent evaporating as when used with rubber, while it passes through the machine, the length not being limited to twelve yards, and there remains only to apply a coat of varnish to increase the brightness of the surface. Thus in one day can be done, not only the work of seven, but a greater quantity by working increased lengths. For oil-dressed cart sheets, omnibus and other driving aprons, waterproof packing materials, and a host of other such purposes, this preparation is most suitable. And lastly, we have the important use as a varnish, either as such or to mix with pigment, as a paint. We all know the time requisite for ordinary paint to dry—this we equally well know is the time requisite to dry or rather oxidize the oil in the paint. The spirit, be it turpentine or other solvent, would quickly evaporate. The coats of paint on doors and walls are but coats of oxidized oil, charged with pigment, as perfect and pliable skin as the coating of a fabric, if too much pigment has not been used. If then you complete the oxidation previously, and dissolve the oxidized oil so as to render it fit for application by the spreading machine of the manufacturer, or the paint-brush of the painter, when the solvent evaporates, which it does very rapidly, you have a flexible, tough, waterproof coating, which will be dry enough for succeeding coats within half-an-hour.

In carriage painting, floor cloth manufacture, and kindred articles, months are now consumed, which might well be saved. The patterns of felt on the table are printed with colours thus prepared, and some pieces of wood, painted at the carriage factory of Messrs. Holmes, are also here.

I am conscious how imperfectly my task has this evening been accomplished, but I have shown you how analogous a substance this material is to the elastic gums. In conclusion, I beg to thank you for the kind atten-

tion you have given me, and must apologise for the many defects and deficiencies which exist in this paper. Many of them would, I flatter myself, have been obviated but for the disastrous fire which occurred at our works the week before last, at which time I was engaged in preparing these particulars, and this has prevented my carefully reviewing the sheets before submitting their contents to you. Such a fatality will, I am sure, be an adequate excuse, and this must also be given as a reason why so poor a display of samples is placed for your inspection, our stock having been entirely destroyed. And I would add that, not being waterproofers ourselves, the samples are more roughly finished than would be the case if produced by more experienced hands.

We hope to have our works in order in about a month, and then we shall be most happy to demonstrate to any one interested, the applicability of this new material to the purposes specified.

DISCUSSION.

The CHAIRMAN in rising to invite discussion upon the valuable paper they had just heard, would offer one or two remarks. Most people who had ever worked in fatty chemistry, had no doubt, at some point of their researches, come upon either an elastic or a semi-elastic body, which tempted them to try to make what Mr. Walton had shewn them he had succeeded in making, viz.—an artificial substitute for india-rubber or gutta-percha. When he received the invitation to take the chair that evening, accompanied by a notice of the subject of the paper, he looked up some old specimens of the results of some elaborate experiments which he made (with an entirely different object) in 1855, on the distillation of castor oil, the residuum of which yielded an elastic material, analogous to that produced by Mr. Walton. He had brought those specimens with him, not on account of their value, but because they might be a means of suggesting some idea to gentlemen present acquainted with this subject, and also because the circumstance was an illustration of the working of the new patent laws. This was a case in which, having a promising invention, the first steps for a patent were taken, and then, finding there were difficulties in the way of working it out commercially, the patent was allowed to drop; but under the old law the patent would have been an obstruction to this invention, which was not the case under the new law.

Mr. P. L. SIMMONDS said, a few years ago, when on a visit to Mr. Walton, at Haughton Dale, he had the pleasure of going over the important manufactory which had been but incidentally alluded to in the paper. The works were specially devoted to the manufacture of those wire cards, or dents fixed in elastic bands, of which specimens were before them. Formerly a production of nature, the teazel, had been alone employed for carding wool and other fibrous substances, and raising the nap on cloth, but Mr. Walton, sen., had largely introduced the wire staples, or teeth, which had come so extensively into use. The simplicity and perfection of the machinery employed to accomplish the object were most remarkable, and these works might certainly be considered a marvel of industrial ingenuity and of the application of scientific skill to a particular and complicated purpose. At that time, when he was visiting him, Mr. Fred. Walton was pursuing, with great assiduity and perseverance, his scientific discoveries—in endeavouring to find substitutes for elastic gums, for papier maché materials, for ivory, &c. He had then solicited Mr. Walton to favour the Society with an account of the beautiful machinery of their works, and of his discoveries, and he was glad to find that he had not lost sight of the suggestion. The importance of the subject which had just been brought under their notice must be evident to all who gave it a moment's consideration. The application of elastic gums, as Mr. Walton had shown, was already widely extended, and their further extension was only stayed by high prices and

deficient supplies. Taking the latest year for which the official accounts were published (1860), the value of the raw india-rubber, and manufactures therefrom, amounted to £545,470, while that of gutta-percha was £161,170. Various quarters were being ransacked for new supplies of these gums, but there were difficulties in the way, in the shape of wild forests; difficulties of collection and transport, which would always tend to keep up the price of these substances, which also diminished as civilization progressed, for no planting of the trees was attempted. The uses, on the contrary, were becoming day by day more multiplied. If, therefore, any substitute, such as that proposed by Mr. Walton, could be brought into successful use, even for some of the minor and less important of the purposes of india-rubber, it would be a great advantage to the public and to the introducers. Moreover, as the material was so suitable and so abundant, it would largely promote the cultivation of the oil seeds in India and other countries, and a new use would be found for some of the vegetable drying oils which were now likely to be superseded for some purposes by the mineral or earth oils. Incidental mention had been made of the American imitation leathers; now he thought it possible that we might get a useful hint or two from the Japanese, who had admirably imitated the ordinary American leather cloths, and with a better face and substance; their mode of waterproofing these, and the oils and varnishes used, were worth careful consideration. A valuable collection, sent home by our Minister there, Mr. Alcock, might perhaps afford opportunities for examination. He noticed present many gentlemen largely interested in the elastic gum manufactures, and he hoped they would favour the meeting with their remarks upon the paper read and any cognate topics, as the subject was one in which the Society had always taken a deep interest.

Mr. RICHARD BEARD, jun., said perhaps he should not be out of order in stating that it was the desire of the firm with which he was connected to have the opinions of those who were interested in the manufacture of india-rubber upon this new substance. They were not themselves engaged in the actual water-proofing, but they wished to bring the material before the attention of those who were engaged in that branch of business, in order that they might test its properties.

Mr. BIRLEY (of the firm of Macintosh and Co.), wished to know whether this new oxidised oil was intended to take the place of india-rubber in all its present various applications, or only in certain cases? He apprehended that whilst it might be applicable to the waterproofing of cloth and other substances, it would hardly be a fit material for elastic bands, or valves for pumps, or for railway buffers. The use of oil as a waterproofing material had long been known, but he had no reason to doubt that this oxidised oil was a great improvement upon the old boiled linseed oil with which they were familiar. He should hardly suppose, however, without very strong proofs, that it was so thoroughly impervious to air and water as india-rubber, and there were many peculiarities in the chemical nature of india-rubber which he thought this new material did not possess. He should be glad to have some information on those points.

Mr. GLASS wished to inquire whether he had rightly understood Mr. Walton to state that the only method of obtaining this oxidised oil was by spreading it thinly upon a surface, and then scraping it off and collecting it layer after layer, and afterwards dissolving it in naphtha, or methylated spirit. If so, he thought this was rather a slow process, and might be improved upon. With regard to the oxidation of oil, it had been suggested that the oxidation would not cease to go on after this substance was prepared, but would still advance rapidly, and this would be likely to make the material crack through its increasing hardness. That was especially the case with gutta-percha, and was a serious objection to its employment for the coating of wires. A slow oxidation went on, and it became brittle. They knew it to be the case with tar-

Paulins and similar materials, that the oxidising continued after the manufacture was completed; the action of the air did not cease after the substance had been partly oxidised. He had no doubt if the process of preparation described by Mr. Walton was the only one arrived at, it could be easily improved upon by bringing the oil to a certain temperature, and passing oxygen gas or atmospheric air into it, by which means he thought the material might be obtained in large quantities. He merely threw that out as a suggestion.

Mr. BEARD, in reply to the question put by Mr. Birley, said it was for the manufacturers themselves to decide how far this material was to take the place of india-rubber in its various applications. He did not at present say that it was a substitute for india-rubber in all cases, but that it was applicable in a great many instances. The next point was that the coating with oil for waterproofing was a thing well known; he quite admitted that to be the case, but the treatment of the oxidised oil with solvents was what was claimed as new. The old process of waterproofing cloth by means of oils occupied some days, it being necessary to lay on several thicknesses, but by the new plan this waste of time was avoided. He now passed to the inquiries made by Mr. Glass, first as to the obtaining of this material by oxidising the oil in thin layers. The method at present employed had been described by Mr. Walton, who had discovered a mode of treating it so that it could be used in the same way as india-rubber. This material was not like oil, which had to be dried in the steam chest, but it would dry in the space of seven or eight yards, as the manufacture proceeded. With regard to the method of dissolving the material, he might state that that was a subject of investigation for many months, as it was difficult to find a solvent that would touch it; but this had now been obtained. With respect to the process of oxidation continuing after the manufacture of the material had been completed, he would state that if the oil was completely oxidized they had a perfectly stable substance, and the oxidation could be carried no further. He had samples which had been in existence two years, and in any temperature they remained as flexible as when they were first made.

Mr. VARLEY said that, many years ago, he had tried experiments with india-rubber, and found it to be readily soluble in turpentine, when it was reduced into a state suitable for manufacture. He was acting upon a committee of the Society at the time Dr. Montgomerie sent the first specimen of gutta-percha to this country. He believed a great portion of the gutta-percha now employed was of so deteriorated a quality that it would not last long for any purpose. It was very different in colour and quality to the genuine specimen which was originally forwarded to the Society by Dr. Montgomerie.

Dr. RIDDELL said some years ago he discovered a substance analogous to gutta-percha in the *Asclepias gigantea*, for when tested it was found to possess qualities similar to gutta-percha, and an experiment was made as to its insulating properties with a mile of telegraph-wire with perfect success. Since that time he had had a specimen of a similar substitute sent to him, the produce of an insipidated gum, from the *Sapota Müllerii* of British Guiana. He had taken the trouble that morning to dissolve some of it, and had brought it with him in the form in which it now was, and it was his anxious desire that some person interested in this subject should test its qualities, as nothing had as yet been done with it. It was a gum extracted from the tree by an operation precisely similar to that employed to obtain gutta-percha. There were many varieties of the *Ficus* which yielded substances analogous to caoutchouc, some of which were principally used by the natives of India as bird-lime. With regard to gutta-percha, he believed it possessed resinous properties to a considerable extent, which he thought tended to impart the brittleness which had been spoken of. He had kept specimens for many years, and found them changed to a substance more like resin than gutta-percha. Another specimen of gum,

the juice of a *Euphorbia*, was used by the natives for fastening handles to their hatchets and knives, and called by them in Madras catamundoo. It possessed great adhesive properties when softened by heat. A considerable quantity of that substance had been sent from Madras, but he had never heard of any use having been made of it here, and he should be glad to have its properties tested by some one acquainted with the subject.

Mr. WALTER HANCOCK said he had devoted himself to the manufacture of gutta percha ever since its introduction into this country, and he should be happy to try experiments upon the material which Dr. Riddell had brought forward. He had been much struck with the paper of Mr. Walton, and he had no doubt the material to which he had drawn their attention would be applicable to many of the minor purposes for which india-rubber was at present employed; and if that were so, it would be a matter of great importance, because it was clear to all who were connected with that manufacture that the supplies of both india rubber and gutta percha had fallen off very considerably as compared with the constantly increasing demand for them in this country. As to the doubts that existed with regard to gutta percha, he thought they had arisen in many instances from a forgetfulness of what the material really was. It was purely a vegetable substance, and was therefore liable to many changes. In the treatment of it they must regard it in its highest state of organisation as a gum, and in its lowest state of organisation as possessing resinous properties, which accounted for its excessive brittleness in some cases. The gutta percha was imported into this country in the form of large blocks, and in these a great variety of quality might be detected. There was a great difference in the structural formation of the material, in its density, in its tensile strength, and, so to speak, in its longevity. Some of the earliest specimens sent to this country were as perfect in their peculiar properties as on the day they were received, sixteen years ago; but in other cases there were evidences of rapid decay in twelve months. There were many causes which accounted for the inferior quality of some of the gutta-percha. It might be taken from a tree nearly exhausted by age or blight, or the trees might be tapped at an improper season of the year, when the juices were weak and watery. There was also another circumstance; the gutta-percha was collected under the fierce rays of a tropical sun, which had a great effect upon the gum in depriving it of its proper density. He had great doubts whether this new material could ever be employed for the operations of telegraphy, like India-rubber and gutta-percha, which, with their great insulating power and inductive capacity, possessed that strength and toughness which formed material elements in the construction of ordinary telegraph cables. The frequent operations of coiling and uncoiling would be very prejudicial to any material which did not possess excessive toughness and strength.

Mr. P. L. SIMMONDS remarked that he believed a specimen of the gum introduced that evening by Dr. Riddell had been brought under notice by Sir Wm. Holmes, and was shown in the Paris Exhibition in 1855, but he did not think much had been done with it.

Mr. BEARD said he had been requested to state the price at which the oxidised oil solution could be supplied. It was from 7d. to 8d. per lb., suitable for double cloth, whilst good india-rubber solution would be, he believed, from 1s. 4d. to 1s. 8d.

Mr. HANCOCK wished to add that he believed the specimen of gutta-percha forwarded to the Society was not the first introduction of that material into this country.* The sample which was experimented upon by his father was received from Mr. Gouger, in 1843. He believed if the material had not fallen into the hands of enterprising manufacturers, the present great results would not have been realised.

The CHAIRMAN said it was now his duty to request the

meeting to pass the usual vote of thanks to Mr. Walton for his very able paper. He might state, with reference to one question asked by Mr. Glass as to the probability of continued oxidation taking place, that the material he alluded to before the discussion took place was exactly in the same state now as when he produced it in 1855; it had undergone no change whatever since then. It had arrived at the same point as Mr. Walton's oxidised oil, and the oxidation had not continued. He thought in this paper of Mr. Walton's they might congratulate themselves upon having a valuable addition to their transactions; and there was a minor point on which they might also congratulate themselves, that was, in the fact that they had that evening arrived at unanimity in the pronunciation of the word "gutta percha," inasmuch as in former discussions one speaker would call it "gutta perka" and another "gutta percha." Not long ago the point was submitted to a distinguished botanist, who was asked to decide what the proper pronunciation was. The reply was, in summer the substance was warm and soft, and then they might call it "gutta-percha;" in winter it was cold and hard, and then they should call it "gutta-perka." He (the Chairman) was happy to find that the temperature of the room that evening had brought them all to say "gutta-percha."

A vote of thanks was then passed to Mr. Walton.

The paper was illustrated by a collection of specimens of the material referred to in the latter part of the paper (oxidised oil), both in its raw and manufactured state. Samples of imitation leather, floor-cloth, kamptulicon, and various kinds of waterproof cloths prepared with it, were on the table, as well as some wooden panels covered with paints prepared with the patent oil, the latter kindly lent by Mr. H. M. Holmes, of Derby.

The Secretary announced that on Wednesday evening next, the 9th inst., a Paper by Mr. J. Gregory Grace, "On the Decoration of the International Exhibition Building," would be read.

MEETINGS FOR THE ENSUING WEEK.

- MON.**.....Geologists' Association, 7. Mr. E. Cressy, "On Sculls and Flint Implements found in the Essex Marshes, during the Progress of the Main Drainage Works."
Entomological, 7.
Medical, 8½. M. de Méric, "On Syphilitic Metritis."
Royal Inst., 2. General Monthly Meeting.
Royal United Service Inst., 8½. Capt. W. R. Mends, R.N., "The Disembarkation of Troops."
- TUES.**.....Medical and Chirurgical, 8½.
Civil Engineers, 8. Discussion upon the Papers by Mr. Brunlees and Capt. Galton, on "Railway Accidents."
Zoological, 9.
Syro-Egyptian, Anniversary Meeting, 7. Mr. Samuel Sharpe, "On Egyptian Mythology," 7½.
Royal Inst., 3. Mr. John Marshall, "On the Physiology of the Senses."
Architectural Museum, South Kensington, 8. The Rev. Lord Alwyne Compton, "On Encaustic Tiles and Tile Pavements."
- WED.**.....Society of Arts, 8. Mr. J. Gregory Grace, "On the Decoration of the International Exhibition Building."
Graphic, 8.
Literary Fund, 3.
Royal Soc. of Literature, 8½.
Archæological Assoc., 4. Annual Meeting.
- THURS.**.....Royal, 8½.
Antiquaries, 8½.
Philological, 8.
Royal Society Club, 6.
Royal Inst., 3. Professor Tyndall, "On Heat."
- FRI.**.....Astronomical, 8.
Royal Inst., 8. Dr. Hofmann, F.R.S., "On Mauve and Magenta, and the Colouring Matters derived from Coal."
Royal United Service Inst., 3.
- SAT.**.....Asiatic, 3.
Royal Botanic, 3½.
Royal Inst., 3. Professor H. E. Roscoe, "On Spectrum Analysis."

* See Journal, Vol. VII. p. 20.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, March 28th, 1862.]

Dated 18th November, 1861.

2893. P. André, J. F. Plieue-Faurie, and J. P. Richard, Bordeaux—Imp. in machinery or apparatus for preparing or manufacturing fuel.

Dated 17th December, 1861.

3165. J. Platt and W. Richardson, Oldham—Imp. in machinery or apparatus commonly called "gins" for cleaning cotton from seeds.

Dated 4th January, 1862.

35. H. D. Pochin, Salford—Imp. in the manufacture of rosin, soap, or size.

Dated 13th January, 1862.

93. W. E. Gedge, 11, Wellington-street, Strand—Improved means or apparatus for gaining or acquiring motive power. (A com.)

Dated 20th January, 1862.

145. A. Lamb, Southampton, and J. White, West Cowes—Imp. in life boats.

Dated 29th January, 1862.

235. W. Clark, 53, Chancery-lane—Imp. in the disintegration and bleaching of textile materials for the manufacture of paper. (A com.)

Dated 31st January, 1862.

257. H. Schatten, Hesse Cassel—Imp. in the manufacture or construction of gas meters.

Dated 1st February, 1862.

279. W. Clark, 53, Chancery-lane—Imp. in machinery or apparatus for the manufacture of festooned edging or material. (A com.)

Dated 4th February, 1862.

289. T. M. Meekins, 44, Chancery-lane—The production of a projectile and explosive force to be used in instruments of war, for an electric-gas gun and electric-gas shell, for the method of using the recoil of weapons for the purpose of increasing the pressure of elastic fluids, for the production of a projectile force, for a method of rapidly loading weapons at the breech, and of a motive force to be used in an electric-gas engine or other engines.

Dated 7th February, 1862.

323. J. Lloyd, Donnington, Shropshire—Imp. in buffers for engines and carriages on railways.

Dated 10th February, 1862.

347. W. Clark, 53, Chancery-lane—Imp. in reflectors. (A com.)
349. W. Clark, 53, Chancery-lane—Imp. in refining cast-iron, wrought, and other malleable iron, and in the cementation of iron. (A com.)

Dated 13th February, 1862.

389. G. C. Burrows, Stoke Holy Cross, Norfolk—Imp. in lounges, seats, or other apparatus for sitting or reclining on, which improvements are also applicable to rocking horses.

Dated 19th February, 1862.

435. C. T. Marzetti and J. Watson, Vine-street, Minories—Imp. in machinery or apparatus for raising, lowering, or otherwise moving or disposing casks and other bodies.

Dated 21st February, 1862.

459. J. Spence, Liverpool—Improved apparatus for transshipping and discharging grain and other substances, and for weighing, screening, and fanning such grain and substances during such transshipment and discharge. (Partly a com.)

467. W. McAdam and W. Chrystal, Glasgow—Imp. in sheaves or pulleys, journals, bushes, and other similar bearing or rubbing surfaces.

Dated 22nd February, 1862.

469. H. Chavasse, T. Morris, and G. B. Haines, Birmingham—An imp. or imps. in the manufacture and ornamentation of metallic bedsteads, part of which is also applicable to other articles.

471. W. H. Ross, Liverpool—Imp. in the manufacture of sugar. (A com.)

Dated 24th February, 1862.

489. R. Waller, Baker-street, Portman-square—Imp. in machinery and apparatus for joining leather and flexible and textile materials, and for the manufacture of boots and shoes, and other coverings for the feet.

Dated 25th February, 1862.

499. J. Carnaby, 7A, Skinner-street—Imp. in turning, managing, and regulating the taps and valves of gas pipes.

Dated 26th February, 1862.

516. A. Green, Rose-cottage, North-road, Forest-hill, Lewisham—Imp. in the method of, and apparatus for, bordering paper, envelopes, and cards with black or coloured borders.

519. G. Rees, Goswell-road—Imp. in the construction of marine sub-ways.

Dated 28th February, 1862.

551. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of hats and bonnets. (A com.)

Dated 1st March, 1862.

555. J. Sim, Aberdeen—Imp. in the construction of gas meters.
556. H. C. Muller, Russell-place, New North-road—Imp. in the manufacture of imitation bear skin caps.
559. P. J. Guyet, Paris—Imp. in taps or valves.

Dated 3rd March, 1862.

578. T. Tillam, Church-street, Deptford-green—An improved method of purifying gas.

Dated 4th March, 1862.

585. J. Giffrs, Middlesborough, Yorkshire—A material or sand for the formation of moulds for casting iron and for other like purposes.
586. J. Ellis, Petersham—Imp. in hooks and swivels for fastening chains of all sizes and for other similar purposes.
592. G. H. Cottam and H. R. Cottam, St. Pancras Iron Works, Old St. Pancras Road—Imp. in horticultural buildings and other glazed structures.

Dated 5th March, 1862.

595. J. Sidebottom, Harewood, near Mottram, Cheshire—Imp. in fire-arms and ordnance and in projectiles.
597. J. Somerville and R. M. Somerville, Netherfield, Westmoreland, and M. Blane, Birmingham—Certain imp. in the manufacture of boots and shoes.
599. J. Chubb, St. Paul's Church-yard, and H. M. Burton, John's-place, Holland-street, Southwark—Imp. in apparatus for displaying or exhibiting jewellery and other valuable articles in glass cases.
601. E. Partington, Heap-bridge, Lancashire—Certain imp. in the method of cleansing and preparing rags or other materials used in the manufacture of paper and in machinery or apparatus connected therewith.
603. W. E. Newton, 66, Chancery-lane—An improved process and apparatus for reducing wood, straw, and other vegetable substances to pulp for the manufacture of paper. (A com.)

Dated 7th March, 1862.

607. J. G. Shipley, 181, Regent-street—Imp. in bridle-heads, reins, and bits.
609. T. Farrimond, Manchester—An improved safety cage for mines.
613. T. Ball, W. Ball, and J. Wilkins, Broadway, Nottingham—Imp. in the manufacture of warp fabrics in warp machines.
616. R. Restall, Croydon, Surrey—Imp. in apparatus for connecting and disconnecting carriages and engines on railways, as also signal lines between guard and driver.
617. T. H. Wood, Blackweir, Glamorganshire—Imp. in apparatus employed in the manufacture of artificial fuel.

Dated 8th March, 1862.

621. G. Edmondson, Queenwood, Southampton—Imp. in washing machines.
623. W. Paterson, W. A. Sanderson, and R. Sanderson, jun., Gala Mills, Galashields, N.B.—Imp. in finishing woven fabrics.
627. W. N. Wilkins, Saint John's-wood—Imp. in the manufacture of pigments for oil and water colours.
629. S. Grice, Birmingham—An imp. or imps. in propellers for propelling ships and boats and other vessels.
631. W. Palmer, Bell House, Southwold, Essex—Imp. in the manufacture of candles.
633. F. N. Gisborne, 3, Adelaide-place, London-bridge, and H. Wickens, 4, Tokenhouse-yard, Bank—Imp. in the means of indicating the presence of fire damp or choke damp in mines, and of dispersing fire damp, and also of telegraphing in mines.
635. F. R. Newton and H. Codd, Esher-street, Westminster—An apparatus for indicating and measuring the flow of liquids.

Dated 10th March, 1862.

637. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in breech-loading firearms. (A com.)
641. W. Parker and G. H. Batman, Copmanthorpe, Yorkshire—Imp. in steam engines.
643. W. J. Bennett, 21A, Millbank-street, Westminster—An improved solution or preparation to be used with Portland and other cements for the production of artificial stone, or for building purposes.
645. W. S. Nosworthy, 79, Coleman-street—Imp. in upright and horizontal pianofortes.
647. J. B. G. M. F. Fret, 29, Boulevard St. Martin, Paris—Imp. in lubricating apparatus.
649. M. Henry, 84, Fleet-street—An imp. in preparing hooks and hooks and eyes for sale or consumption. (A com.)

Dated 11th March, 1862.

651. R. Peacock, Manchester—Imp. in the manufacture of window blinds.
653. E. Parfitt, Drury-lane—A watch protector.
655. E. Humphreys, Deptford—Imp. in steam engines.
657. E. G. Camp, Bristol—Imp. in brushes or apparatus for brushing.
660. H. Baynes, Clements-lane—An imp. in bankers' cheque books.
661. R. Smith, Glasgow—Imp. in telegraph posts.

663. W. Clark, 53, Chancery-lane—Imp. in apparatus for effecting submarine operations. (A com.)

Dated 12th March, 1862.

664. A. R. Le Mire de Normandy, Odin-lodge, King's-road, Clapham-park—An improved method of connecting gas and other pipes.

667. W. H. Latham and F. C. W. Latham, Bolton—Certain imp. in machinery or apparatus for perforating and numbering paper or other substances to be employed as "tickets" or where other "counter registration" is required.

669. A. Watson, Glasgow—Imp. in hot-pressing apparatus.

671. W. Conyers, Leeds Bridge, Leeds—Imp. in currying leather.

675. W. Clark, 53, Chancery-lane—Imp. in the manufacture of coloured inks. (A com.)

677. J. E. Grisdale, 73, Oxford-street—Imp. in photographic cameras, and in the mode of fixing the lens therein.

679. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of cartridges. (A com.)

Dated 13th March, 1861.

688. J. Howard and J. Bullough, Accrington, Lancashire—Imp. in warping and beaming machines.

692. R. A. Brooman, 166, Fleet-street—Imp. in apparatuses for measuring and regulating the flow and pressure of gas, parts of which are applicable to hydraulic receivers and to steam generators. (A com.)

700. J. Kent, Hyson-green, Nottingham—Imps. in cleansing and bleaching. (Partly a com.)

Dated 14th March, 1862.

706. L. Gabler, 41, Bernard-street, and M. Zingler, 14, Granville-street—Imp. in manufacturing articles from ivory and bone.

708. A. J. Paterson, Edinburgh—Imp. in the construction of electric telegraph cables.

Dated 15th March, 1862.

712. W. Clark, 53, Chancery-lane—An improved brake for railroad carriages. (A com.)

720. Capt. H. Y. D. Scott, R.E., Brompton Barracks, near Chatham—Imp. in the manufacture of cement.

722. J. Avery, 26, Mark-lane—Imp. in purifying coal. (A com.)

724. J. Robey, 49, Hereford-road North—Imp. in manufacturing and refining sugar, and in apparatus employed therein.

726. J. T. Pendlebury and T. Pendlebury, Bury—An improved form of lubricator.

Dated 17th March, 1862.

730. W. B. Lord, Plymouth, and F. H. Gilbert, Brixton—Improved means or apparatus for raising, lowering, and releasing ships' boats or other heavy bodies.

732. W. Bowser, Glasgow—Imp. in ships' fire hearths, or boiling and cooking apparatus.

734. J. Weems and W. Weems, Johnstone, Renfrew, N.B.—Imp. in apparatus for indicating the pressure or quantity, and in regulating the discharge of fluids.

736. W. Barford, Peterborough—Imp. in rollers for rolling land.

738. G. T. Bousfield, Loughborough-park, Brixton—Imp. in cranks for driving sewing machines and other machinery. (A com.)

740. J. Hicks, Hatton-garden—Imp. in mercurial barometers.

744. T. Myers, Brighton—Imp. in meters for measuring water, gas, or other fluids.

Dated 18th March, 1862.

748. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved needle threading apparatus. (A com.)

752. W. Tongue, Bradford—Imp. in machinery and in processes for preparing, heckling, dressing, and combing flax, hemp, silk, and other fibrous materials.

756. J. A. Ronketti, 31, Northampton-road, Clerkenwell—Imp. in meteorological instruments and thermometers.

758. S. Slack, West-street, New Sneinton, Nottingham—Imp. in the manufacture of stockings and other fabrics in circular knitting machines.

760. R. A. Brooman, 166, Fleet-street—Imp. in the manufacture of barytes and barytic products, and the application of these substances in the manufacture of sugar and other uses. (A com.)

Dated 19th March, 1862.

762. A. Krupp, Essen, Rhenish Prussia—Certain imp. in the method of manufacturing shafts for steamboats and other purposes.

764. S. Desborough, Noble-street, St. Martin's-le-Grand—Imp. in the manufacture or construction of sewing or other needles.

766. S. Moore, Liverpool—Certain imp. in machinery for compressing and cutting tobacco.

768. R. A. Brooman, 166, Fleet-street—Imp. in reproducing or in producing copies of guipure, lace, embroidery, and other like articles. (A com.)

770. R. A. Brooman, 166, Fleet-street—Imp. in apparatuses for drawing in and paying out chain cables, applicable to windlasses and capstans. (A com.)

Dated 20th March, 1862.

776. R. M. Roberts, Kensington—Imp. in obtaining and applying motive power.

INVENTION WITH COMPLETE SPECIFICATION FILED.

818. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Certain imp. in machinery for the production of ornamental stitching or embroidery. (A com.)—24th March, 1862.

PATENTS SEALED.

[From Gazette, March 28th, 1862.]

March 28th.		
2281. J. B. Howell.	2473. W. Malam.	
2431. T. Smith.	2477. C. Hussen.	
2455. J. Davies and T. Evans.	2478. A. David.	
2456. W. Matthy.	2487. J. Lansley.	
2458. R. A. Brooman.	2494. G. Nares.	
2459. W. Thompson & T. Stather.	2538. W. Clark.	
2462. C. G. Hill.	2578. W. Clark.	
2464. W. T. Henley.	2625. F. A. Calvert.	
2470. T. Evans.	2638. F. O. Ward.	

[From Gazette, April 1st, 1862.]

April 1st.		
2447. J. W. Scott.	2530. W. Mould, J. Hall, S. Cook,	
2480. G. Knox.	and W. H. Hacking.	
2488. J. Edwards.	2552. H. Nelson.	
2490. W. Rowan.	2604. J. H. Johnson.	
2492. J. S. Collins.	2614. J. Bourne and E. Kidd.	
2496. T. Hughes.	2616. C. De Bergue.	
2502. G. K. Stothert.	2636. G. England.	
2506. A. Ford.	2643. G. H. Birkbeck.	
2522. F. Curtis.	2720. E. Leigh.	
2523. W. Palmer.	2732. J. A. Fanshawe and J. A.	
2525. T. Tidmarsh.	Jaques.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, March 28th, 1862.]

March 24th.		
765. M. Firth.	781. J. W. Kelly.	
768. M. A. Muir & J. McIlwham.	786. I. Spight.	

[From Gazette, April 1st, 1862.]

March 27th.		
778. T. Carr.	836. J. Eccles.	
787. T. Taylor.	March 28th.	
798. C. P. Coles.	780. W. Mossman.	
806. T. Ivory.	March 29th.	
809. S. S. Bateson.	800. A. V. Newton.	
	851. L. Brierley and H. Gearing.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, March 28th, 1862.]

March 24th.		
664. J. H. Johnson.	663. J. McKinnell.	
709. W. Tytherleigh.		

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4458	March 29.	Parts of Jewellery	Felix Mege	95, Wimpole-street, Cavendish-sq., W.
4459	" 31.	Box Chest and Case Fittings... ..	Thos. Bianchi	Regent-place, Birmingham, and 16, Gresham-street, London, E.C.
4460	April 1.	Scarf, Finger, and other Ring	Hyman Hyman	Birmingham.
4461	" "	Spring Bale Hook	William Partridge	Royal Artillery, Woolwich.

Journal of the Society of Arts.

FRIDAY, APRIL 11, 1862.

THE NATIONAL MEMORIAL TO THE PRINCE CONSORT.

A preliminary meeting, with a view to the formation of a Committee to carry out the views expressed in the Report of the Council published in last week's *Journal*, was held yesterday at the house of the Society of Arts. Amongst those present were the Duke of St. Albans, the Marquis of Salisbury, K.G., the Duchess of Norfolk, the Countess of Derby, the Earl and Countess of Malmesbury, Lady Manners, Sir Thomas Phillips, the Chaplain-General, the Rev. Canon Lonsdale, Mr. M. H. Marsh, M.P., Mr. W. H. Bodkin, Mr. Henry Hoare, Mr. John Kelk, the Rev. Samuel Martin, &c.

The Marquis of SALISBURY having been called to the chair,

Mr. LE NEVE FOSTER read the above-named report of the Council, as well as letters from the Archbishop of Canterbury and the Bishop of Oxford, expressing their regret at not being able to attend, and their desire to do anything in their power to promote the objects of the meeting.

Lord HENRY LENNOX, M.P., moved the following resolution:—

That this meeting cordially agrees with the report of the Council, and heartily concurs in the proposal that arrangements be made to afford to every one who desires it, the opportunity of taking part in the intended National Memorial of affection and gratitude to the Prince Consort.

This was seconded by the Hon. ARTHUR KINNAIRD, M.P., and carried unanimously.

Mr. HENRY POWNALL, Chairman of the Middlesex Sessions, moved:—

That a General Committee be appointed, which shall represent all interests and all classes in the country, to give effect to the foregoing resolution by their collective and individual assistance in the formation of local sub-committees, and in the receipt of subscriptions.*

This was seconded by Mr. KELK, and carried unanimously.

The Rev. G. R. GLEIG (Chaplain-General) moved:—

That a Central Executive Committee be appointed, whose special duty it shall be to make known to each individual residing either in the parishes and hamlets of the United Kingdom, or in the colonies, the character of such Memorial as may be approved by her Majesty, and to obtain the subscriptions of all who desire to contribute to the fund; and that the Committee be instructed to appoint a chairman and a vice-chairman, as well as a treasurer, and that such Central Executive Committee have power to add names to the General Committee, and

*As soon as this Committee is fully formed a list will appear in the *Journal*.

to their own body. The Central Executive Committee to consist of—

The Marquis of Salisbury, K.G.
The Earl of Derby, K.G.
The Earl of Malmesbury.
Sir Thomas Phillips.
Mr. M. H. Marsh, M.P.
Mr. Henry Cole, C.B.
Mr. Harry Chester.
The Honorary Secretaries.

This was seconded by the Rev. SAMUEL MARTIN, and carried unanimously.

To this Committee have subsequently been added—

The Duke of St. Albans.
The Hon. F. Byng.
The Hon. Colonel Talbot.

Mr. HENRY HOARE moved:—

That Mr. Le Neve Foster, Mr. Samuel Redgrave, and Mr. John M. Clabon, be the Honorary Secretaries.

This was seconded by the Rev. Canon LONSDALE and carried.

The Earl of MALMESBURY proposed the thanks of the Meeting to the Marquis of Salisbury, for his able conduct in the chair.

This was seconded by Mr. W. H. BODKIN, and carried by acclamation.

INTERNATIONAL EXHIBITION OF 1862.—SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

INTERNATIONAL EXHIBITION OF 1862.—GUARANTEE.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £448,150, have been attached to the Deed.

EXAMINATIONS, 1862.

NOTICE TO LOCAL BOARDS.

The attention of Local Boards is particularly drawn to Par. 14 of the Examination Programme, as follows:—

14. The previous examinations must be held by the Local Boards sufficiently early in the year 1862 to allow

the results to be communicated to the Council, on a form which will be furnished on application, on or before the 23rd April, *i.e.*, four weeks before the commencement of the final examinations.

Any Local Boards expecting to have Candidates desiring to be examined in music, should apply to the Secretary of the Society of Arts without delay, who will furnish them with a copy of a form of test to be used at the Previous Examinations, as mentioned in paragraph 112 of the programme.

CONVERSAZIONI.

The Council have arranged for three conversazioni at the South Kensington Museum during the time of the International Exhibition; the dates fixed are Wednesday, the 7th May, the 9th July, and the 8th October.

Cards will shortly be issued to members of the Society, with the privilege of introducing a lady. Invitations will also be sent to Her Majesty's Commissioners, the Guarantors, the Foreign Commissioners, Jurors, the principal exhibitors, and others connected with the International Exhibition.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The raised platforms beneath the domes having been completed, workmen, during the last few days, have been busily employed in erecting a spacious amphitheatre in the eastern dome, which, on the 1st of May, is to accommodate the orchestra.

Here, also, a body of masons may be seen actively engaged in laying the foundation of Messrs. Minton's large fountain, whose clear waters will leap beneath its roof of glass to the height of 50 ft.

The decoration of the inside of the tympana, under the direction of Mr. Crace, is making rapid progress. Much light has been thrown on the method which this artist has employed in his treatment of the building, by the paper which he read on Wednesday evening, before the Society of Arts, and which will be found in the present number.

The great windows at the extremities of the northern transepts, have been retraced in Gothic forms, and filled in with stained glass, supplied by Messrs. Hardman and Co.; and while they suggest notions of ecclesiastical decoration, they furnish a pleasing variety in a building dedicated to the three sisters, Art, Science, and Industry.

The only part of the building which as yet is quite ready for the reception of visitors, is the English Picture Gallery, entrance to which is strictly forbidden. The task of hanging and grouping, a difficult one, has been performed by Mr. Redgrave, R.A., and Mr. Creswick, R.A.,

with pre-eminent skill, judgment, and taste. The principle on which they have proceeded preserves the chronology as far as possible, but throws the pictures into harmonious groups. The result is, that as you walk along the line of the gallery, at every 20 or 30 feet the spectator has an agreeable and picturesque arrangement of several works, in which the contrasts have been made so as to show each work to the best advantage.

Mr. Samuel Redgrave is still busily at work with the water-colour drawings, and has adopted similar principles to those already explained.

Some slight progress has been made during the week by foreign exhibitors of art, the Swiss and Norwegians displaying an energy which contrasts favourably with the continued apathy of their continental brethren.

The eastern annexe presents many features of interest. Exhibitors are adorning and altering its appearance daily by the erection of stalls and tasteful galleries, which are reached by spiral staircases. In the large open court which forms the heart of this annexe, greenhouses of various sizes, forms, and patents are springing rapidly into existence. These, it is hoped, as the season advances, will be filled with a choice collection of fruits and flowers.

Outside the building much of the bustle which distinguished the past week has subsided, except at the entrance of the machinery annexe, where engines and mechanical appliances still continue to arrive. It is a matter of regret that the manufacturers of locomotives to the Great Western Railway Company should not have sent for exhibition one of their magnificent engines, to illustrate the broad gauge, as the narrow is worthily represented by a splendid locomotive belonging to the London and North-Western Railway Company.

Now that all the goods may be said to be brought under the roof of the building the scene in the interior is full of activity. Exhibitors are vying with one another in erecting their show stalls and counters. On the English side alone, however, have the objects intended to be submitted to the public criticism, been drawn from their hiding places and arranged in their cases. On the foreign side boxes, bales, and packages of every size and shape lie scattered around, and piled in irregular heaps, which, though to the eye they seem confusion itself, under good organization will require but little time to put in order.

Although the art designs for manufactures are vastly better than they were in the Exhibition of 1851, this is not a display which fairly represents the progress of design in this country since that period; for this there is a very obvious explanation. It is not that better designs do not abound, but for various trade and other reasons they are not to be procured. Manu-

facturers who have designers in their employment consider the designs their own property—they hesitate to show them—value them but little, and frequently destroy them during the process of manufacturing. The Art Design Committee have had great difficulty in obtaining suitable specimens for exhibition.

The Commissioners have invited the mayors of the chief towns in Great Britain and the delegates of foreign countries and of British colonies, to furnish flags emblazoned with designs, to be hung in the nave and transepts, with a view, not only of giving prominence to them as contributors to the exhibition, but also of lending additional ornament to the building. It is gratifying to know that this suggestion of Her Majesty's Commissioners has been warmly taken up, and communications have been received from many of those who were addressed on the subject, undertaking to furnish banners as desired.

Some questions have been raised as to the necessity of taking season tickets for the opening. Excepting Foreign Ministers, the Foreign Commissioners, and the Jurors, it is requisite that all persons who wish to be at the opening should be provided with season tickets. To mark the spirit of the Commissioners' rules on this subject, the Commissioners themselves and the heads of the staff, as in 1851, have purchased season tickets.

Another question has been asked, What is meant by "Gentlemen occupying official reserved seats?" These are seats reserved for persons invited to be present, as holding some office or representing some class of the community, and those only who appear in Uniform or any kind of Official dress will occupy front places; others, in private dress, will have reserved seats at the back. Ladies, of course, will be in morning dress.

SEVENTEENTH ORDINARY MEETING.

WEDNESDAY, APRIL 9TH, 1862.

The Seventeenth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 9th inst., the Right Hon. Lord Taunton in the chair.

The following candidates were proposed for election as members of the Society:—

Amory, John Heathcoat..	Tiverton
Amies, Nathaniel John...	Manchester.
Dutton, Thomas Robert..	{ Goldhawk-road, Hammer-smith, W.
Elliot, William Henry Fletcher	{ 22, Austin Friars, E.C.
Newcombe, S. Prout	Rose-hill, Dorking.
Noble, William	8, Onslow-pl., Brompton, S.W.
Priestley, Frederick	15, Berners-st., Oxford-st., W.
Storey, Thomas	Lancaster.
Walton, Frederick.....	{ British Grove Works, Chiswick, W.

The following candidates were balloted for and duly elected members of the Society:—

Baiss, James	{ 102, Leadenhall-street, E.C., & The Firs, Brenchley, Kent.
Cheetham, John.....	Staley-bridge, Lancashire.
Child, William Henry ...	{ 21, Providence-row, Finsbury, E.C.
Clayton, Richard Clayton Brown	{ 22, Norfolk-crescent, W., and Athenæum Club, S.W., and Adlington-hall, Chorley, Lancashire.
Edwardes, Grant	Ledbury-road, W.
Reed, Thomas	Downham Market, Norfolk
Ross, Augustus	{ Glycena-lodge, Lavender-hill, S.W.
Seymour, Hugh H.....	30, Upper Brook-street, W.
Unwin, George	31, Bucklersbury, E.C.

AND AS HONORARY CORRESPONDING MEMBER.

Fournier, Charles	{ Bureau du Ministre de la Guerre, Paris.
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Previously to the reading of the paper, the Secretary called attention to some specimens of telegraph cable, covered with cane, of which a description will be found at page 345.

The paper read was—

ON THE DECORATION OF THE INTERNATIONAL EXHIBITION BUILDING.

By J. GREGORY CRACE.

The building for the International Exhibition, now so shortly to be opened, has been lucidly explained by Captain Phillpotts, in the paper read before you in December last; therefore, it will be unnecessary for me to take up much of your time by a description of the various parts of it, and I will only briefly recall to your minds the main features and arrangement of the building, in order that you may the more easily understand me when I refer to them in my description of the decoration. This arrangement of the building will be easily understood by referring to the ground plan. The principal front faces the Cromwell-road, and has a south aspect; it extends nearly 1,200 feet. On the first floor of this front range the series of Picture Galleries. Parallel with this front is the nave, 800 feet long, and terminating at each end in the great domes, each 160 feet in diameter. From these extend again, north and south, the transepts, having each a length of 200 feet on either side of the domes. The nave and transepts may be represented by the letter



the extreme length being 1,200 feet, and the width at the ends 560 feet. The height to the pitch of roof in nave and transept is 100 feet, and the width between the columns 85 feet. The great domes have a diameter of 160 feet, and rise to an interior height of 200 feet. Galleries 50 feet wide extend on both sides of the nave and inner sides of transepts. Other galleries, 25 feet wide, are carried round the outer sides of transepts and sides of walls of picture galleries, and one 12 feet wide against walls of refreshment rooms.

Parallel with the nave, and on either side of it, are the glass courts; those on the south side being 200 feet wide, those on the north 87 feet.

On the north side of this area is a large range of building, forming the refreshment rooms; through these, under a triple archway, nearly opposite the main entrance from the Cromwell-road, is an entrance to the Horticultural Gardens, of which a most pleasing view is here seen. This completes the description of the main area of the building; but at both extremities extend two very important additions, namely, the eastern and western annexes, the latter nearly 1,000 feet long, and the former 775 feet.

Having refreshed your memory as to the form, size,

and arrangement of the building, I will now speak of the decoration of it.

We will enter by the great archway in the centre of the south front, and passing by the staircase which leads to the picture galleries, and to which we will return by-and-bye, we proceed to the nave. I confess that when I first saw this interior my heart quailed; its general aspect was not encouraging; the day was damp and bleakly cold; the rough polygonal arched principals and diagonal boarded ceiling looked heavy and difficult to manage; the light from the clerestory windows fell in faint streams on the muddy road, that was then the traffic way in the interior; masses of dark scaffolding, obstructing the light from where the domes were then being erected, and the various trials of colouring which had been already made, one at least of them by an able man, showed me that it would require very careful consideration indeed before I should decide upon what style of decoration to adopt. Do not let me be unjust nor let my own apprehensions as to a successful treatment of the decorations lead you to suppose that I mean to reflect on the building itself. When I came quietly to consider all the features of the construction, I found that those apparently heavy principals only required to be properly treated in colour to be sufficiently light, that they were also of most ingenious construction; that the proportion was pleasing; and that the light of the clerestory windows was amply sufficient. I fear that many may have seen the building under the same adverse circumstances that first presented it to my view, and have passed criticisms not so just as the merits of the undoubtedly talented contriver of the building should deserve. Pardon me if I have wandered for a moment from the subject of my paper, more especially as I earnestly hope, that in any discussion that may follow, it will be borne in mind that it is only the decoration of the building which is now before us.

Well, we are in the nave. How to decorate it? I had not too much time to think, the work must be done; it was January the 23rd when I received the authority from the Royal Commissioners to assume the decoration of the building with the entire responsibility of the results, and the work was to be completed by March.

After careful consideration I decided that the general tone of the roof must be light, and that the best colour would be a warm pale grey; that the arched principals must be made to stand out clear from the roof; that they must look well in a perspective of 800 feet; and that they must not look heavy or confused as they approached each other in the distance. No single colour would do, and after a pretty stiff bit of reflection of twenty-four hours, I confirmed myself in my opinion of what would be the most likely way of treating the principals.

I have remarked that the form of these is polygonal, and is best explained by the scale-drawing marked (A). They are in three thicknesses, the centres of the outer planks covering the joints of the inner ones.

I considered that the form precluded the use of a continuous repeat ornament, I therefore decided on following the form of the construction, and adopted panelings of blue and red alternately, relieved by coloured lines, intersected at the joints by circles of black, on which are gold stars, and from these spring ornaments in vellum colour with green in the filling, as shown in the coloured drawing.

Following out this arrangement I had a pattern painted on paper of the full size of one of the principals, and it was fixed in its place within a week from the time of my appointment; part of that identical pattern is now in this room; it has never been altered, and thus exactly it has been carried out throughout the roofs of the nave and transepts.

Until the principals were coloured, it seemed to me that the thicknesses were lost; I wished to make the construction evident, and I therefore coloured the two outer

edges in chequers of black and vellum colour, and the centre edge full red. As to the bracings above the polygonal arches I coloured them the warm-wood colour, with red or blue coloured lines on the face, and the under thicknesses red.

I have said that I decided on warm grey for the roof of nave. I did so because it gave space and lightness; and on its surface I introduced an upright scroll ornament in red, with gold, star-like rosettes, sparingly introduced. My object in this ornament was to raise the apparent pitch of the roof, and to relieve and warm the effect of the grey. The horizontal purlines, on the contrary, I kept purposely light, so as not to depress the rise of the roof, or interfere with, or confuse the effect of the principals. The ridge piece of the roof, in itself comparatively small, I marked as strongly as possible, as the apex, in black and vellum white, *en chevronné*; on each side I coloured a margin of maroon red, and a little below that a bordering of very warm green, shaped to accord with the top scrolls of the red vertical ornament, the green being relieved with rosettes of gold colour. At the base of the slope of roof this green is again introduced in much the same way, and the band of maroon also. Below this are the clerestory windows.

The next important features in the nave are the iron columns, supporting the principals as well as the galleries. These I have painted pale bronze colour, relieved with gold colour vertical lines. The capitals are gilt; the grounds of the ornaments being picked in rich red or blue alternately; the centre blocks of the columns are also coloured red, with bands of blue, or, *vice versa*, the mouldings being gilt, and the same style of colour is continued to the bases. The top plate above the columns is painted bronze colour, relieved with light gold colour ornament on the upper part, and a vitruvian scroll in gold colour, with a maroon red base on the lower part.

The gallery railings are light bronze colour, the rose, shamrock, and thistle ornaments being partly gilt, and the whole backed with deep red cloth. The plate under the gallery is painted oak colour, relieved with deep brown interlaced ornaments.

I have kept the part below the line of arches purposely quiet in colour, in order that the brilliancy and richness of the various articles exhibited may not be interfered with. The roof, on the contrary, is rather vivid in colour, to carry up, as it were, in some degree, the gaiety of the scene below; and this will be still further sustained by a series of banners of the various countries whose products are assembled in this International Exhibition.

Much variety of opinion has been expressed at my introduction of the vivid colours in the arched principals of the nave; but I think that many who fancied it would look too powerful, will confess their surprise at its comparatively quiet effect now that it is completed. The colours being properly balanced have neutralized each other. Most of you probably know that blue, red, and yellow, in the proportion of three, two, and one, when mixed with white, produce a grey, exactly the same as the grey produced by mixing black and white. I will show you. I take ultramarine blue three parts, vermilion two parts, and chrome yellow one part. I mix them together, add some white—you observe it is grey. I take some black and white, mix them, and identically the same grey is produced. If you paint on a disc radiated stripes of blue, red, and yellow, in proper proportions, and make the disc revolve rapidly, you find grey produced, the same as if they were stripes of black and white. The effect of the roof of the nave exemplifies this theory.

I have heard it said by some that it would have been better to have employed panelings of one colour instead of two to each principal, and made the principals alternately blue and red; in my opinion they would have been utterly disappointed; the striped contrasts would have by no means given the softness, richness, and glow of the present colouring. To convince myself I, at one stage of

the colouring, tried, by fixing blue paper over the red panellings in one principal, and red paper over the blue panellings of another, but the effect was not nearly as good, and I was confirmed that the principle I had adopted was the right one.

You will find this principle of counterchanging colours adopted in most of the decorations of the early masters, which abound in Italy. Those decorations, so beautiful, so interesting, rich, glowing in colour, full of fancy and taste in the ornament, the masses well arranged, show the most perfect harmony everywhere, and are dignified by often acting as the framework of the highest gems of art. My son, who has been lately studying from these works in Italy, has made a series of sketches from some of them, which I thought might illustrate the observations I am addressing to you, and prove not uninteresting to those who are fond of decorative art.

You will find in the roof of the Upper Church of Assisi, in the Chapel of St. Corporale, of Orvieto, in the choir of Santa Croce at Florence, and in the Palazzo Spinola, examples of counterhanging of colouring, and in the roof of the Cathedral of Lucca the chevronese of black and gold. In fact, the works of the Italian decorators of the fifteenth century afford most valuable lessons in ornamentation and colouring. But I must not be led astray from my more immediate subject. Having described the nave, I will now proceed to the domes which rise at either end of it, and form a point of intersection with that and the transepts. They are undoubtedly the main features of the building.

In plan their form is dodecagonal, or twelve sided, but they are made to assume the appearance of an octagon, because the arches towards the nave and transept cross each other, and form a kind of angular-arched opening or 85 feet span, the intermediate arches being about 35 feet span. From the floor of the nave to the springing of the domes is 114 feet, the total interior height to the crown of the domes being about 200 feet. There are 12 main ribs to each dome, meeting in a sort of ring plate, and thence eight of them carry on to the centre. The crown of each dome has an ornamental zinc covering, as explained in the drawing; all below this is glass.

My principal difficulty in carrying out the decoration of the domes was, that I could see nothing of them. The scaffold formed a series of solid stages or floors, through which it was impossible to view anything; and I confess I never could mount the ladders above 100 feet; but even there the scaffolding was so thick that I could see nothing of the top, and very little of the cornice, fascia, and walls.

At last Mr. Ashton, the engineer, contrived to get for me an open square box into which I got, and I was drawn up by means of his beautiful little engine very pleasantly to the top; yet when I got there the ceiling almost touched my head, so that I had no opportunity of judging beforehand of the effect of distance and light upon my colouring, and I knew well that they were very formidable elements for consideration. The knowledge that the scaffold would be taken down before I could possibly judge of the effect, and that when once down I could never hope to touch my decoration again, caused me many an anxious thought.

My drawings will best explain to you the colouring I adopted for the top of the domes. The main ribs are painted bright red, with spaced black and white at the edges, and a fine gold line up the centre spreads at intervals of about four feet into lozenges and circles containing gilt stars on a blue ground; where the main ribs reach the ring plate I carry round the red, marking the points of intersection with black and white; thence the eight main ribs are painted deep blue, relieved with red, gold, and black, until they meet in the centre pipe or pendant, which is gilt bordered with red. The shaped covering, or umbrella, as I am accustomed to call it, is painted light blue; gold colour and gilt rays diverging from the centre and streaming a considerable way down the blue, the

shaped outline of which is bordered with red and gold ornament.

In decorating the walls of the domes, the solid parts between the arches, and the springing of the roof, it was necessary to consider the probable effect of the great mass of light above. On the one hand it was desirable to sustain it with sufficient strength of colour, on the other it would be dangerous to make it too heavy.

The moulding of the cornice and fascia are painted vellum colour, very slightly relieved by gilding; the trusses are gold colour; the fascia between them is red, with a vellum patera; the soffit is green. The broad fascia below is painted blue, and on it is inscribed in gold letters, three feet high, the exordium of David, in the 29th chapter of the first Book of Chronicles, "Thine, O Lord, is the greatness, and the glory, and the victory, and the majesty: for all that is in the heaven and the earth is thine;" and "O Lord, both riches and honour come of thee, and thou reignest over all; and in thine hand is power and might, and in thine hand it is to make great."

The large iron columns, which rise nearly 100 feet high, are painted dark maroon colour, their capitals being richly gilt. The paneling between the arches and the frieze is painted in shades of red, relieved by coloured lines; in the four broad compartments are inscribed, on dark green panels, Europe, Asia, Africa, and America; below, on a circle, are the initials of those, so beloved by us all, Victoria and Albert. On the eight spandrels to the four main arches, are medallions, eight feet diameter, by Mr. Burchett, of the Kensington School of Art, emblematic of Manufactures, Commerce, and the various arts and sciences which lend their aid. These were executed in an exceedingly short time and, like all the rest of the work, with no opportunity of judging how they would look in their elevated situation. I should add that round the red paneling is a broad margin of sage green, on which are stencilled pateras. The moulding of the arches is painted vellum colour, the top fillet being gilt; and the face of them ornamented with vitruvian scroll in dark colour.

The walls at the gable end of the nave and transept are treated so as to recall the arched form of the principals. Under these a semi-circular panel is formed of warm brown colour, bordered by a broad blue margin, on which are gold stars. Inside the panels are written the following sentences:—

On the east end of nave—

"The wise and their works are in the hand of God." Ecclesiastes, chap. ix, v. 1.

On the east end of transept—

"Alternately the Nations learn and teach."—*Cowper*.

On the south-east end of transept—

"Each climate needs what other climes produce."—*Cowper*.

On the west end of the building the sentences are in Latin, being the part occupied by foreign exhibitors. At the end of nave is written—

"Gloria in excelsis Deo et in terra pax."

At the north-west end of transept—

"Domini est terra et plenitudo ejus."

At the south-west end of transept—

"Deus in terram respexit et implevit illam bonis suis."

Inside these semi-circular panels are a series of radiating panels, painted maroon, and bearing the names of the various sciences and arts which have affinity with the objects exhibited. The coloured drawing will more directly explain what I have thus endeavoured to describe.

I have mentioned that on either side of the nave extend the series of courts roofed with glass. These admit of very limited decoration, and the colouring I considered should be of a subdued and retiring character. The objects exhibited are to be the show.

The brick walls which form the boundary on one

side not being dry, it was necessary to have a colour which would not be materially affected by that circumstance. I adopted a quiet maroon colour, made with venetian red and purple brown. The columns are painted pale bronze, relieved by gold colour. The skylight frames are painted cream white, relieved by lines of red and blue alternately. Under the galleries the ceilings are painted very light grey, the joists cream white, the bottom edges lined blue, and the girders lined maroon red.

Let me here offer a few words of advice to the exhibitors of manufactured goods in silks, woollens, and cottons.

The effect of many rich and valuable stuffs was seriously impaired at the Exhibition of 1851, by injudicious arrangement of them. Brocaded silks of gay colours, or printed woollens or cottons, are best exhibited if somewhat shaded from the light; it would be well, too, if they were contrasted with deep tones of velvet or other plain material.

In the arrangement of plain fabrics, such as cloths, merinos, or velvets, much will depend on the way the colours are brought together. Avoid blazing contrasts of colour, such as bright red next bright green; or bright blue next bright yellow; such contrasts are not harmonious—let one of the two colours always be subservient to the other. It is not so much what colour a material is, but how that colour is made to appear. It is necessary to bear in mind that all colours have their complementaries, which add to or detract from the beauty of the adjoining colours, according to what they may be. Thus, the complementaries of red are green; of blue are orange; of yellow are violet. If you cut out pieces of grey paper in an ornamental form, and stick a piece on each of the three colours I have named, you will find, in a shaded light, the grey will be fully tinted by the complementaries of these colours. But you cannot lay down precise rules. An experienced artist can bring any two colours together by properly modulating them.

Nothing is so charming and so refreshing to the eye as an harmonious arrangement of colours; they are "like a sweet chord of music to the sense." The hand of nature never errs, whether it brings together scarlet and crimson, as in the cactus; scarlet and purple, as in the fuschia; yellow and orange, as in the calceolaria; or the colours in the varied plumage of exotic birds—the harmony is always beautiful, ever perfect. The laws of harmonious colouring are a necessary part of the knowledge of the manufacturers of coloured fabrics.

I will suggest a few contrasts.

- 1 Black and warm brown.
- 2 Violet and pale green.
- 3 Violet and light rose colour.
- 4 Deep blue and golden brown.
- 5 Chocolate and bright blue.
- 6 Deep red and grey.
- 7 Maroon and warm green.
- 8 Deep blue and pink.
- 9 Chocolate and pea green.
- 10 Maroon and deep blue.
- 11 Claret and buff.
- 12 Black and warm green.

Resuming our immediate subject, we will now return to the principal staircase, which we passed on our entrance from the Cromwell-road. The walls of the lower part of this staircase will be painted maroon red, as a background for the statues, bas reliefs, and other art works which will be placed here. The upper part of the wall, or, rather, space above the wall, will be enclosed by the various specimens of stained glass. Arrived at the landing, we enter the centre vestibule, from which we first gain the view of the magnificent range of picture galleries, extending 500 feet on each side. This vestibule will itself be filled with sculpture. The walls are coloured subdued red up to the string course, above that they are sage green.

The picture galleries on the east side contain the collection of the British, those on the west side the foreign schools; in size and arrangement they are exactly the same. The width of the galleries is 50 feet; the wall is 31 feet high, up to the cornice, from which springs a deep cove supporting the centre light.

Many of the pictures to be exhibited having been painted many years, it was essential to have a very low tone of colour for the walls; I adopted a sage green. When the colouring was partly done, and there remained some of the white wall still uncoloured, it was thought by many that the tone would be far too dark, and I mention this to show how difficult it is to judge of effects of colour till all the parts are complete. I never at present hear any fears expressed of the too great depth of colour. The cornice is painted vellum colour with maroon in the hollow, the ground of the cove is tinted of the same hue as the walls, but much lighter. I have divided it into two compartments by upright margins in vellum colour, on which is stencilled ornament on a deep ground; the compartments of green have marginal lines of maroon. The soffit is also vellum colour relieved by stencil ornament in maroon, and the upper cornice is cream colour.

The end walls of the principal galleries are slightly decorated; on either side of the arched entrance it is intended to place statues, and therefore it was necessary to have a maroon-red panel background; this is carried up to the springing of the arch, and thence broken into five concentric panels; above these are painted ornaments supporting medallions, in which are inscribed the names of painters.

To show with what energy it was necessary to carry out the works, I will mention that the whole of the picture galleries on the east side were painted and decorated in five days. I was asked on Saturday if my designs were ready—I decided the colours on Monday morning, the work was commenced at mid-day, and completed mid-day the following Saturday.

At the end of the principal galleries we enter the auxiliary galleries, which have a length of nearly 250 feet on each side of the domes; in these will be arranged the collection of water-colour drawings, architectural designs, &c.; here I have adopted a lighter tone of the same colouring, as in the larger galleries.

Crossing over to the north side of the building we enter by the triple archway, which I have before mentioned, the immense range of apartments devoted to refreshments; unfortunately, the state of the walls is such, that it will not be possible for the present to decorate them, except indeed the three large rooms on the upper floor, where the ceilings are of wooden construction; but I must needs confess that nothing I could do on the walls would compete with the charming view to be seen from the windows which run the entire length of these rooms. The whole of the New Horticultural Gardens is seen with beautiful effect; all their ornamental parterres, fountains, and walks, bounded by the handsome colonnades and conservatory, being seen in greater perfection than from any part of the Gardens themselves.

Having thus described to you, very imperfectly I confess, the decoration we have done, let me explain to you, briefly, how we did it. It was indispensable, in all the designs for the decorations, that they should be so arranged as to be easy of execution; that the important principle of "the greatest effect at the least cost," should be strictly attended to. Therefore, all ornament had to be done by stenciling, and all the colouring on woodwork was to be done in distemper. What the stenciling is I will explain presently. Distemper is a very ready means of colouring surfaces, because one coat of it bears out and gives a result more solid and more luminous than four coats of oil paint, but it has the disadvantage of not being preservative like the last, and it cannot be washed. Perhaps no one will ever discover the very rough state of the principals of the roof of nave, which are simply saw-cut, besides being blemished by the process of carting and lift-

ing them. The coat of distemper conceals all that. It is composed of whiting and size, made of any tint required by adding the usual colours.

Stencilling is performed by cutting out the pattern required in stout strong paper, which is then varnished over to strengthen and preserve it; taking care also to leave proper ties to keep the pattern together. But as example is better than precept, I have brought here a few of the stencils made use of for the decorations, and will show you how the work is done. I think that in the progress of the work more than 100 men must have been employed at this stencilling, out of whom, I have reason to believe, scarcely half-a-dozen ever did it before, and yet the work has been very well executed, and reflects much credit upon all those engaged upon it. I am happy to acknowledge the intelligence and perseverance of Mr. Huish, the foreman painter of Messrs. Kelk and Lucas, in directing these men. Also they will join with me, I am sure, in confessing how much they and I are indebted to the able assistance of my artist, Mr. Haelin; nor can I be silent on the constant aid I have received from my eldest son, whose sketches on these walls will sufficiently speak for him. The task I undertook was attended with difficulties of what I may call a diplomatic kind. The contractors were at the expense of carrying out the work I directed, and were naturally not desirous to be wasteful; the Royal Commissioners wished the work to look as well as possible, therefore, it is easy to be imagined that where one side used the whip the other pulled the reins; nevertheless, I feel bound to state that the contractors desired to have the decorations of the building well carried out, and that they have been actuated by liberal and unselfish feelings.

I have little more to say, but there is one word of thanks I cannot but give expression to on this occasion; it is to acknowledge with gratitude the encouraging support I have derived from the criticisms on my work which have appeared occasionally in the *Times* newspaper.

In a few days the International Exhibition will be opened—the collected Industry, Science, and Art of the whole world, thus brought together, will be opened to your view. I trust that they will in no way be injured by what I have done.

DISCUSSION.

MR. G. WALLIS was sure they must all feel indebted to Mr. Crace for the very able paper he had read, explanatory of the principles he had followed in the decoration of the building for the International Exhibition. To himself, personally, as the superintendent of the textile division, he might say it was a matter of more than ordinary interest, and he had on several occasions in the course of his duties called the attention of the exhibitors in his division to the principles of decoration which Mr. Crace had endeavoured to follow out, as an example worthy of being imitated by them in the decorations of their fittings, viz., that those decorations should be carried out with a view to the proper display of the articles exhibited, rather than with an eye to the ornamentation of the fittings themselves. At present, he was sorry to say, things looked as though the exhibitors contemplated carrying on an extensive business as a half-mourning establishment, and he thought they would do much better if they had a little more colour here and there, though there were instances where a little less brilliant colouring at those points where there would be plenty of colour afforded by the articles themselves was desirable. In these respects he had endeavoured to urge upon the exhibitors the principle laid down by Mr. Crace. In fact, he might say the principle had been followed out which ought to be regarded in all designs, viz., the purpose for which the design was intended; and Mr. Crace, in the discharge of the duty cast upon him, asked himself, What are the purposes to which the building is to be devoted? Is it an exhibition of the

building itself or of the articles within it? He had regarded it as the casket which was to contain the objects of attraction, and that principle had been thoroughly carried out. He (Mr. Wallis) remembered the sensation he experienced when he saw the style adopted in the decoration of the Exhibition building of 1851. His feeling at the time was—although he confessed that the ultimate result was more satisfactory than he anticipated—that the building was decorated for itself rather than for the articles that were to be exhibited within it. Mr. Crace, in the present instance, had followed a different principle. As had been explained in the paper, he had kept the portion of the building in which the articles were to be exhibited of a quiet and low tone of colour, using brighter tints as he went upwards, to balance the brilliant effects of the articles to be exhibited below, so as to harmonise the general effect when the building was filled with its contents. No person could judge of the true effect of the decorations at the present time, when the view was obstructed by scaffold-poles and other rough objects; but he looked forward, as no doubt all present did, with great interest to the opening of the Exhibition, when would be seen the result of a system of decoration, with a view to the proper display of the contents of the building rather than of the building itself.

MR. PHILIP PALMER wished to ask Mr. Crace whether his attention had been directed to the opportunity which seemed to be afforded him, of decorating the long range of the clerestory windows of the building. He thought if some attention had been paid to that point, the effect would have been richer than it was. They expected to see, not only from artists of this country, but from those abroad, some splendid works in the way of painted and stained glass, and therefore it had been a question with him whether a greatly improved effect might not have been produced by some relief having been given to the plain glass along the immense range of the clerestory windows, so as to enhance the architectural features of the building. He believed that Mr. Crace had given much attention to the art of colouring and painting on glass, and therefore he rather regretted that something of the kind had not been introduced in connection with the clerestory windows, which, in their present state, he thought were scarcely befitting a palace of art. He felt them to be the greatest eyesore of the building. It was not too late to remedy that defect, as in three weeks, under Mr. Crace's superintendence, those windows might be greatly improved—not by distemper or stencilling—but by the introduction of blue, amber, or other coloured glass, as might be required.

MR. BERESFORD HOPE, M.P., suggested that the remarks just made opened another question with regard to the continuity of the windows, namely, whether it would not be better to deal with them not as an entire mass, but to divide them by stripes of cloth or boarding, so as to make them real clerestory windows, and not an unbroken range of windows; and this opened out an objection to a portion of Mr. Crace's colouring on which he (Mr. Hope) had not been able to satisfy himself. That was the alternations of blue and red on the parts of the principals nearest the windows, which showed forward as the glare of light fell upon them, from the fact of those being the parts of the building where most light was concentrated, and which caught the eye first. Instead of producing harmony of colour, the eye in the first instance was caught by the unfortunate effect of red and blue, which he thought produced an unfavourable influence as regarded the general colouration, and interfered with the aerial tint of the light grey in the roof.

MR. E. RIMMELL wished to know whether it was intended that the eastern annexe should receive any further amount of decorations. In its present state it had a very barn-like appearance. A much larger amount of painting had been bestowed upon the western annexe, which would very soon be destroyed by the steam and smoke from the machinery. He also wished to ask a question upon another subject. He and other exhibitors

had been asked to hang bannerets above their stands, to increase the decorative appearance of the building, but he thought they ought to be limited to certain colours, whilst at present they were allowed to select their own colours, and hang them where they pleased. Unless there were some rules as to the colour and pattern of their bannerets, anything but a good effect would be produced. He thought this matter might be subject to some general control.

Mr. PETER GRAHAM could not refrain from adding his humble mite of praise for the manner in which Mr. Crace had undertaken and carried out this work of decoration. It was a task of no ordinary difficulty, as might be inferred from the fact that all those who were called upon to try experiments failed, and all appeared to be quite "at sea" as to what should be done till Mr. Crace himself was called in. He had to deal with a building of extraordinary dimensions; he had to adapt all his ornamentation to the various proportions of that building; and he had to do this at a time when large masses of scaffolding prevented him from seeing what the general effect would be. He had nothing but his own experience and taste to guide him, and no opportunity of trying experiments as to the effects. Under these circumstances it was undoubtedly a great success. Whether they regarded the form of ornamentation as adapted to the building, or the harmony of the colours employed, he would say, in his own opinion, it was a great success. At the time when Mr. Crace was first painting one of the ribs of the roof, to judge of the effect, he (Mr. Graham) did think he was studying rather the decoration of the building itself than with reference to its suitability for the goods to be shown in it; and he took the liberty of expressing that opinion to him at the time, and he also thought the experiment of the alternate red and blue a dangerous one. He was, however, free to confess the effect was, to his mind, harmonious and pleasing; but he still thought a loftier and more airy effect would have been obtained if those colours had not been alternated. He also thought the cutting the columns in half where the galleries intersect was open to question; but as regarded the picture gallery, he considered the success was perfect, and that the pictures would be shown to very great advantage. Upon the whole, he thought the Royal Commissioners and the public were indebted to Mr. Crace, not only for what he had done within the building, but for the description of it with which he had favoured them that evening.

Mr. JOHN DILLON was extremely anxious that the gentleman who had favoured them with this paper should not misunderstand the criticisms which had been made. He (Mr. Dillon) had heard a great many criticisms of the building itself, and should probably hear many more; but he was much struck with the distinction which had been drawn by Mr. Wallis at the commencement of the discussion, viz., that they must look rather to the purposes for which the building was designed, than to either its architectural or decorative merits as a building. He had heard it censured as a work of architecture, and comparisons had been made with other buildings abroad; but it was to be borne in mind that it was to be used merely as a place for the display of goods, and was not so much to be regarded as a work to be tested by the strict rules of architecture. The same remarks would apply to the decoration of the building; and in that respect it might be said Mr. Crace had drawn a proper distinction. He had had in view the suitability of his colouring to the objects the building would contain; and when he stated that in the lower portions he had applied subdued colouring, so as not to interfere with the beauty of the goods exhibited, and, as he ascended higher, had introduced more brilliant colours, to harmonise with the goods below, he had certainly acted upon a right principle. They were bound in looking, both at the building and at its decorations, to consider its object, and not to regard it as a specimen of architecture. In that view he felt that they owed Mr. Crace a debt of

gratitude, and he begged, as far as he was personally concerned, to thank him for what he had done.

Mr. WATERHOUSE HAWKINS remarked that all that could be said in the way of criticism upon Mr. Crace's work, as well as upon the description he had given of it, must be only a reiteration of the admiration and praise which every work produced upon sound principles like those enumerated and carried out by Mr. Crace must at all time ensure. That the decorations of this building had been no ordinary effort, they must all readily admit, and those who had seen it inside or outside must have at once recognised the immense difficulty of making any scheme of decoration which should be suitable to its architectural features—if he might be excused for using that word in connection with the building. Any scheme of decoration which would have architectural principles for its basis Mr. Crace had wisely dispensed with, and had only looked upon the structure as a fit means to the end in view—the display of the materials to be exhibited within it. It was customary, with their national feelings and characteristics, to express their admiration of success in proportion to the difficulties overcome, and if this were so, there must be one unvarying theme of praise for that which Mr. Crace had done, when they considered the immense difficulties which he had to grapple with, either as regarded the contradictory forms of which the building was composed, or the difficulties of space, of time, of situation, and circumstances under which he conceived and carried out his design. It was therefore, unquestionably, a remarkable effort of the human mind to conceive such a system of decoration as this, with little or no opportunity of trying experiments, and judging of the effect that would be produced. He thought it would be admitted that the building of 1851, of which he (Mr. Hawkins) had had so much experience, was overpowered by light, and consequently it was scarcely possible to criticise Mr. Owen Jones' system of colouring. Yet they could not but recognise that it was desultory, and the effect in many instances anything but congenial or beneficial to the objects exhibited below, particularly in the case of the textile fabrics—such as silks, satins, and brocades, which were not placed under such favourable circumstances as they would be in the present building. He had only to add, further, that, considering all the circumstances, they could but express their unequivocal thanks to Mr. Crace for what he had done.

Mr. CRACE, in reply upon the discussion, said perhaps it was hardly in good taste to say he was almost disappointed. He thought the discussion would have been a little more vigorous, from the sort of criticism which was offered pretty plentifully in various quarters at the commencement of his work; and if he might disclose his secret thoughts on this occasion he would say he had proposed the paper read that evening as the only legitimate way that seemed open to him to meet those criticisms. With respect to the observation which had been made with reference to the clerestory windows, he thought the gentleman who spoke on that subject could have hardly realised the extent of surface throughout that building. How many windows there were and how many hundred feet there were in each window he could not say; but the aggregate surface was so tremendous that any application of stained glass, except upon the voluntary principle, would be quite out of the question. He begged to thank Mr. Hope for the kind observations—complimentary on the whole—which he had made in reference to the colouring. He should be prepared to say to any one who objected to the introduction of these colours upon the principals, what would they put in the place of them?

Mr. HOPE said he did not object to the introduction of the colours, but only to the alternation of the red and blue at points where they were exposed to the most brilliant light.

Mr. CRACE felt the force of what Mr. Hope had expressed, but there was always considerable difficulty in decorating any long repeat of the same form with

any one colour. In this instance he might safely say he "stuck to his colours"—for if one shade of colour only had been used for these principals, they would have looked undefined, and like a cloud in the distance. The effect of any one of the principals in the western annexe was agreeable in itself, but they looked a perfect cloud when seen in the repeat. The question was not how one would look, but what would be the effect of the whole. Then with reference to what Mr. Hope had said as to the continuity of the line of light from the clerestory windows; no doubt it was a just observation. The object had been to get all the light possible from these windows; but he had heard it suggested by several people—and he coincided with it—that it would produce an agreeable effect to introduce some intervals between them, so as to break this line of light. But this was difficult; the object was to get the light, and any alteration now would be extremely costly. The next point was the observations with respect to the eastern annexe. It must be apparent to all that in carrying out a large work like this, there were difficulties not perhaps generally known. Towards the completion of the decorations, as the season advanced, the skilled labour which was necessary became scarcer every day, and it was with regret he stated that he was afraid it was from that cause alone that the eastern annexe would not be so satisfactorily completed as it was desirable it should be. With regard to the bannerets, he quite agreed with the observations of Mr. Rimmel. Some time ago, the invitation to have banners was given by circular to the exhibitors. He could not do wrong in saying that he protested at the time against a general profusion of banners in the important parts of the building. He stated that to have a heterogeneous mass of colours brought together would be most destructive to the appearance of the building, and he was happy to state that in the nave, at least, the banners would be under his direction; and he sincerely trusted all those who had committed to them the choice of banners, would bear in mind that white must be absent from them. There was no colour more destructive to the general colouring of exhibited articles than pure white; and where a quiet tone of colouring had been adopted, it was desirable to avoid any very prominent spots. Therefore, very intense red or blue, very pure white, and very gaudy yellow must be kept out of these banners, and only the most quiet colouring must be maintained throughout. He hoped these observations would be received in good part by those who were likely to provide these banners, and that they would be discreet in the colours they employed. The general expression of opinion with reference to this work was of such a kind as amply to compensate him for the anxiety of mind he had felt in carrying it out.

The CHAIRMAN said it was now his duty to make a proposition to the meeting which he was sure would meet a ready sanction—it was to propose a vote of thanks to Mr. Crace for the paper they had heard. For his own part, although he had had great pleasure in attending this meeting, and felt highly honoured by the compliment of being asked to preside over it, he had, nevertheless, come as a listener, and not as one who had any pretensions to offer any opinions of his own upon the subject which had engaged their attention that evening, and with which probably most in the room were better acquainted than he was. He thought it must be most gratifying to Mr. Crace to hear the comments that had been made. It was evident that he had committed to him a task of no ordinary difficulty, and it required no artistic knowledge to see that in the decoration of this building the great thing to be kept in view was the uses to which it was to be put rather than the ornamentation of the building itself. Mr. Crace had very clearly stated that as the principle on which he had acted and which had induced him to adopt the style of ornament he had introduced. He thought on the whole the friendly criticism which had been made on what he had done, led them to entertain a confident expectation that the

work would be worthy of the great occasion for which it was designed, and he agreed with Mr. Crace that the full effect could not be realised until the building was occupied by its contents. He thought it was matter of regret that the subsidiary decorations of the building by the exhibitors themselves had not been placed under the control of Mr. Crace's good taste. It would be unfortunate if the general effect were marred by the introduction of injudicious decorations in various parts of the building, and he thought it desirable, in a discussion of this kind, to call attention to that point. They were now, within a very few weeks of enjoying that great gratification which they anticipated from beholding this building stored with its magnificent contents, and there could be no better preparation for that event than hearing the excellent observations of Mr. Crace, and the interesting discussion that had taken place upon them. He was quite sure he was only carrying the wishes of the meeting into effect when he proposed that they should give their thanks to Mr. Crace for his kindness in favouring them with this very interesting paper.

The vote of thanks was then passed, and acknowledged by Mr. Crace.

The Paper was illustrated by various coloured drawings and diagrams, showing the decorations of the building, as well as by a series of drawings of Italian decorations made by Mr. Crace, jun.

The Secretary announced that next week being Passion Week, the Society would not hold a Meeting; and that on Wednesday evening, the 23rd inst. a Paper, by Mr. Samuel Sidney, "On the Effect of Prizes in Improving Manufactures," would be read.

RATAN DEEP-SEA ELECTRIC TELEGRAPH CABLE.

Mr. C. S. Duncan, the inventor, in adopting the Ratan Cane as an external protecting cover to the conducting wire and insulating medium, desires to employ a material which has not hitherto been used for deep-sea cables; he has been guided in the choice of cane by its being a fibrous substance, having great flexibility, lightness, strength, and durability when submerged. The cane has long been used by the Chinese and the Malays for cables as applied to anchors, and for making fast their junks to the banks of the great rivers and canals throughout China; and the testimony of officers in the Royal Navy, and merchants of great eminence, who have resided for many years in that country, corroborate this fact; and the ocean animalculæ are not known to touch or destroy it.

The natural silicated rind has been submitted to great hydraulic pressure, and is found to be impermeable to the passage of water into the interior fibre, and, like all other woody substances when long submerged, as in the case of the timbers of a vessel that has foundered at sea, becomes eventually petrified and indestructible. The cane itself neither possesses resinous, oleaginous, nor saccharine matter; consequently, no destructive chemical change is effected by submersion.

The cane can be obtained in inexhaustible quantities in Lower Bengal, Ceylon, Singapore, and China, in lengths of fifty feet and upwards, of an uniform gauge when properly selected, and at a price so moderate as to render this cable the cheapest that can be constructed, according to the statement of the inventor.

Cane is susceptible of many combinations, either with or without wire, laid on in a spiral form, and is prevented from kinking by using strands, either of wire, hemp, or cane, laid on at right angles to the length.

The joints under test are as strong as the cane itself, and arranged to fall at intervals so as to break joint.

In paying out the cable, very slight machinery appears to be required; and instead of its descending perpendicularly from the ship's side, it will submerge in an even or horizontal position, having sufficient weight to overcome flotation, and cause it to gravitate gradually to the bottom of the ocean.

The Ratan cane, as a non-conductor, will not generate heat in the hold of the vessel, thus keeping the insulating medium at all times cool and equal, and allowing the tests to be carried on with greater certainty. The advantages, therefore of this cable may be summed up thus:—

1st. Its great flexibility, without elasticity or compressibility.

2nd. In not being affected by heat or moisture.

3rd. Its being imperishable in sea water.

4th. Its strength and perfect protection to the insulating medium. All such media being too tender to be exposed as outer coverings, from certain risk of puncture, abrasion, shifting from vessel to vessel, pressure on lower sheaves of the cable when coiled in the hold from the super-incumbent weight, and injury from over-heating.

5th. The silicated rind having a complete natural security against the attacks of animalculæ.

6th. Its pliability in coiling, facility in paying out, and submerging in an even or horizontal line without kinking.

7th. The buoyancy and resilient properties of the cane, rendering it less susceptible to friction and abrasion.

Finally, the inventor states that it can be manufactured at a price one-third less than any other cable.

The following are stated to be the results of tests which have been applied to this cable:—

The cable when covered with cane alone—weight $\frac{3}{4}$ ton. Breaking strain, $2\frac{1}{2}$ to 3 tons.

When combined with steel wire—weight not exceeding $1\frac{1}{2}$ ton. Breaking strain, from 4 to 5 tons.

When constructed in this latter manner, the sinking or dead weight of the steel wire is compensated for by the floating power of the cane, and the cable would descend in a horizontal position to the ocean bed slowly and without strain, and capable of spanning any sub-oceanic valley three or four miles in width, without risk of breaking.

Diameter, in every instance, within an inch.

BRITISH MUSEUM.

In order to give the public generally the utmost facilities for seeing the British Museum during the time of the International Exhibition at Kensington, the trustees have laid down the following special regulations:—

1. That the Museum, instead of being closed from the 1st to the 7th of May next, be closed on Monday, the 28th of April, and re-opened on the following Monday, the 5th of May.

2. That from the 5th of May to the 30th of August inclusive, the reading-room be kept open for readers, as usual, daily, Sundays only excepted; but not later than five o'clock.

3. That the Museum collections, including those parts of the library of printed books and manuscripts to which visitors are now admitted on public days, be kept open daily, Thursdays and Sundays excepted, from ten o'clock in the morning till eight in the evening, during the months of May, June, July, and to the 16th of August, inclusive, but till half-past seven only for the remainder of that month.

4. That during the same months and days the reading-room and a small portion of the libraries annexed to it, as well as the whole of the North Library, with the exception of its western extremity, be open for the admission of the public generally, only from five o'clock to eight, or half-past seven, as before mentioned; and that from nine to five o'clock none but readers, for the purpose of study, be admitted to the reading-room, or to any of the libraries,

except such of the rooms as are usually accessible to visitors throughout the year on public days.

5. That after five o'clock the reading-room and the libraries generally be not used for the purposes of study.

6. That Thursdays be reserved for cleaning the several departments, and that no visitors, excepting readers, be admitted into the Museum on that day.

NEW SOUTH WALES AND THE INTERNATIONAL EXHIBITION OF 1862.

The following is abridged from the *Sydney Morning Herald*:—

The articles of the produce or manufacture of New South Wales, intended to be forwarded to the International Exhibition in London, have been exhibited to the public, in Sydney, in the hall of the School of Arts. The local exhibition was opened on the 16th of October, and closed on the 7th of November, and proved during the three weeks an object of great attraction to the public. The charge for admission on four days in the week, and during every evening, was sixpence; the low charge, in connection with the beauty, the excellence, and the tempting variety of the articles exhibited, drew large crowds to the hall, no fewer than 2,660 visiting it in one day. The total number of visitors was 14,894, and the amount received for admission was £423. In order that the public might have every opportunity of inspecting the articles which are to represent the colony at the Great Exhibition, they were on view up to the day before the packing commenced. The goods are expected to measure about two hundred tons. Mr. Sedgwick Cowper, the Secretary to the Exhibition, proceeds to England in the *Vimeira*, which was to sail on the 1st of December last.

A catalogue of the articles forwarded from the colony has been published by the Commissioners. The first portion of the catalogue is devoted to a description of the specimens of woods, compiled by Sir William Macarthur and Mr. C. Moore. Interesting papers follow upon the cereals, fibres, and wines. Next follows a letter from Mr. Ledger, accompanying the stuffed alpacas, giving all the information which every one who inspects his beautiful specimens must be anxious to possess. Under the head of mineral products are elaborate papers on coal fields, and on the gold fields, communicated by the Rev. W. B. Clarke. These are followed by some succinct particulars respecting the production of copper, iron, and other minerals and rocks. The detailed catalogue of the deposits encountered in sinking for gold at each of the diggings in the colony, gives a complete geological description of the successive strata, and also a statement of the depth of each. The catalogue concludes with a list of the miscellaneous articles contributed, and an alphabetical list of exhibitors.

Some particulars respecting the more important articles of colonial produce and manufactures represented in the Exhibition are here given.

THE STUFFED ALPACAS.—This group was decidedly the most attractive object in the Exhibition. The graceful beauty of the animals, their healthy condition, and long soft glossy fleeces, were topics of universal admiration, while much astonishment was expressed at the extraordinary length of fibre of the fleeces, particularly in the younger lambs; in addition to which those who took a practical view of Mr. Ledger's service recognised in the now thoroughly acclimatised animal the source of great future productive wealth. The slaughtering and preservation of the specimens were carried out upon the recommendation of Mr. Ledger, who urged that the reproduction from the progeny of the alpaca and the llama was an important and scientific fact, which ought to be represented at the International Exhibition, as the specimens would refute the erroneous theory frequently propounded of the non-reproductive power of the progeny resulting from a

cross between the llama and the alpaca, and would also prove by their wool and general appearance that each successive cross has been an improvement on the previous one. In a letter, accompanying the specimens addressed by Mr. Ledger to the Commissioners, he alluded to the peculiar characteristics of the llama and the alpaca, the llama being the larger animal, having short coarse wool, bare legs, belly, head, and face; long neck, with very short wool, and large ears; while the pure alpaca has a smaller body, finer, heavier, and longer staple of wool, legs covered to the feet, short neck with long fine wool, head and face covered, and short ears. The dash of the llama blood infused into the alpaca is alleged to have produced a "larger-framed, harder-constituted, heavier, finer, and more glossily-fleeced animal than could be obtained by the close *in and in* breeding so zealously carried out by the Indians in Peru." The following is the description given by Mr. Ledger of the seven specimens:—"No. 1. Brown and white pure breed female llama, aged five years and three months. No. 2. Gray pure male alpaca; age, two years nine months. No. 3. Black, cross between similar animals to Nos. 1 and 2; age, two years nine-and-a-half months. No. 4. Brown, from dam similar to No. 3, by sire ditto to No. 2; age, one year eight months. No. 5. Brown, from dam similar to No. 4, by sire ditto to No. 2; age, one year three months. No. 6. Black, from dam similar to No. 5, by sire ditto to No. 2; age, seven months. No. 7. Lamb, suckling from dam similar to No. 6, by sire ditto to No. 2; age three months."

WOOL.—The early period at which the local exhibition was held rendered it impossible to present specimens of the new clip of wool. A supplementary exhibition was to be held at Mort's auction rooms, early in January, when a large collection of the fleeces was expected.

TALLOW.—The production of tallow was poorly represented, there being only one sample cask exhibited by Mr. John Nott, of West Maitland, and some specimens of alpaca tallow. Raw hides, an important article of produce, are entirely unrepresented.

OILS.—The oils exhibited were numerous. One of the most noticeable samples was that of oiline, or tallow oil, exhibited by Mr. Kirchner, of Grafton. There were two samples of neatfoot oil, the one forwarded by Mr. J. Youdale, of West Maitland, and the other by Mr. H. Bell, of Pitt-street. A sample of the same article purified was exhibited by Mr. E. W. Rudder, of Kempsey, Macleay River. In addition to these, Mr. Harbottle forwarded samples of sperm oil, of southern whale oil, and dugong oil.

SILK.—There were six samples of raw silk exhibited, all very neatly got up.

CURED MEAT.—Preserved meats have latterly formed an important article of export, but the principal producers did not send any samples to the Exhibition. Some samples of sides of bacon and a cured pig, exhibited by Messrs. Solomon, Vindin and Co., of West Maitland, were placed in a very prominent position. Some cured hams were exhibited.

The manufacture of cheese was represented by some samples.

The other samples of animal products are of a miscellaneous character, consisting of whales' teeth, goose feathers, bone manure, beeswax, cochineal, and honey.

INDIGENOUS TIMBERS.—Colonial timber was the best represented at the Exhibition of any of the indigenous products. The Commissioners were fortunate in being able to avail themselves of the services of gentlemen who had extended knowledge of forest timbers, and who were prepared to enter with zeal and interest upon the task of procuring specimens of them. Sir William Macarthur and Mr. Edward Hill undertook to collect specimens of indigenous woods from the Southern districts, and Mr. Moore, director of the Botanic Gardens, volunteered to procure specimens from the Northern districts. The result of the zealous labours of these gentlemen was a magnifi-

cent collection of woods, which will undoubtedly constitute the chief feature of the contributions to the International Exhibition. The short notice afforded for procuring the specimens necessitated their being cut while in a green state; many of them are consequently splitting up, and will, not, therefore, appear to the best advantage. The exquisite grain of the specimens has naturally been their chief attraction with visitors to the Exhibition; and this is a very important quality, many of the woods being well adapted for panels and other ornamental purposes. The woods are cut in slabs of about four feet in length; their width is that of the trunk of the tree, the size of which is thereby indicated; they are all cut smooth and polished. The specimens from the southern districts are about 270 in number, and represent all the more valuable indigenous timbers of the colony. The Eucalypti run from one to forty-nine, every variety of gum being exhibited. The specimen numbered one, is a piece of white iron bark; this timber stands first in durability and strength, and when tested at the Paris Exhibition, was found to bear upon a cubic inch 11,000 lbs. pressure; the box of Illawarra, of which there is a good specimen, also stood a very severe test; another variety of box is believed to be well adapted to wood engraving. There are also some very fine specimens of the forest oak, generally used for shingling, but showing a very rich grain. The white beech, used for decking small crafts, is a noticeable wood. Amongst the other valuable woods represented, may be mentioned several varieties of stringy bark, used extensively for flooring boards; spotted gum, used for ship-building; tea tree, the texture of which is very close, valuable for underground work; red ash, mahogany, and black butt, a trunk of which was lately found to measure 41 feet in circumference.

The specimens collected by Mr. Moore in the Clarence and Richmond districts are 115 in number, and consist principally of trees referred to under the designations of "Rich Brush" and "Cedar Brush." Some of the red cedars are stated by Mr. Moore to be above ten feet in diameter, and to yield, when cut down, as much as 30,000 feet of saleable timber. A number of interesting samples of colonial woods were exhibited by Mr. Rudder, of the Macleay River. One of them was a piece of iron bark from a tree that was cut down in the year 1836; it has since been constantly exposed to atmospheric action, and is now perfectly sound. Another specimen was a piece of ash that had been used as part of a mill, and had been exposed to all weathers for about 15 years. The other specimens consisted principally of pine, mahogany, iron bark, gums, mangrove, and cedar. Mr. Dawson, colonial architect, also contributed some specimens of woods; they consisted of apple-tree, shingle bark, cedar, red-gum, pine, myall, and oak. Some valuable specimens were also exhibited by Mr. Cuthbert, ship-builder.

Amongst the other samples showing the durability of the native woods was a piece of flooded gum, taken out of the steamer *William the Fourth*. This vessel was built in the year 1830, on the William River, by Messrs. Marshall and Lowe, and the whole of her timbers are stated to be as sound as the sample exhibited.

CEREALS.—The samples of cereals were very numerous, and attest the adaptability of the soil and climate of this colony to the cultivation of grain. They were sent from different parts of the colony, the largest exhibitor being Sir W. Macarthur. There were six samples of wheat, all very finely developed. There were six exhibitors of maize, sent both in cob and in bottles. Only one sample of rye was exhibited, and no samples of oats or other kinds of cereals. There were five exhibitors of wheaten flour, and two of flour of maize. There were samples of potato flour and potato starch, and seven very fine samples of arrow-root.

COTTON.—The specimens of cotton were numerous and very creditable, fully demonstrating that cotton can be successfully cultivated in the colony.

MINERAL SPECIMENS.—The production of gold—at

present the most important of our mineral resources—was very completely represented. The various kinds of gold, and the conditions under which it is found, are illustrated by numerous samples, in three cases, prepared under the direction of Captain Ward, R.E., of the Mint. One of these contains forty-eight characteristic specimens of the various gold-fields; the most noticeable of them is a nugget from Stony Creek, 13 ounces in weight. There are fifteen samples of gold from the Northern district, the same number from the Western, and eighteen from the Southern district. A second case contains thirty or forty specimens of auriferous quartz from some of the reefs which are worked, or are considered capable of being worked, with profit. One of the finest of these is a sample from the Caledonian reef at Adelong, and by its side is a small ingot of the gold, worth £4 2s. an ounce. A third case contains samples of strata, arranged in small bottles, illustrating the alluvial districts of the colony.

The specimens of copper ore are very numerous and are all beautiful, and with one or two exceptions, sent from the Western district.

Specimens of copper are exhibited by Messrs. Morehead and Young, obtained from the Good Hope Mines, near Yass. They are of a rich character, consisting of red oxide and blue and red carbonate, intermixed with quartz, and oxide of iron. The other specimens, sent by Messrs. Morehead and Young, are chiefly from the Cadiangullong Mines. Some of these are of very large dimensions,—one weighing upwards of 6 cwt., and others of almost equal bulk. There are also some fine blocks of ore from the Canoblas mine, in the same neighbourhood, situated about twelve miles from Orange, in the county of Bathurst. These are exhibited by Mr. S. Samuel, who has also sent a variety of other specimens of the same product. Amongst these, was a specimen weighing about four hundred-weight, of rich ore from the Ophir mine. There are likewise some ingots smelted by Mr. Christoe, at the Ophir copper mine. The Canoblas and the Cadiangullong mines are the same lodes, distant about a mile, and are both being worked—the former by Messrs. Morehead and Young, who employ a large number of men, and have raised a considerable quantity of ore—it is estimated about six hundred tons. Furnaces are being erected for smelting, and it is expected that in the course of a few months large quantities of refined copper will be sent to Sydney for shipment. The lodes at these mines are said to be about seventy feet in width; they produce ore in large quantities, and of great richness.

Some fine specimens of copper ore are exhibited by Mr. Croaker, of Bathurst, from a mine worked by him about twelve miles from that township. About eighty tons of ore, averaging over twenty per cent., have been sent from this mine during the last two months.

The iron mines are represented at the Exhibition by several interesting specimens. The mine best known is the Fitzroy mine, at Mittagong, on the Southern Road, seventy-five miles from Sydney; some fine specimens of the iron are exhibited by Mr. J. H. Thomas, of the Railway Department. The iron at Mittagong lies in a compact mass, and extends to a considerable depth, covering, as visible on the surface, an area of about sixteen acres.

Another sample of iron ore is thus labelled:—"From the surface of the ground on the property of Mr. H. B. Lockyer, on the Great Southern-road, near the Wollondilly river, contributed by Mr. J. H. Thomas, of the Railway Department." The vein at this mine, which is about 90 miles from Sydney, is, as visible to the eye, about four hundred yards in length, and fourteen feet in width. A shaft has been sunk alongside it, and a level driven at a depth of twenty feet to the ore.

The ore in both of these mines contains above 60 per cent. of iron. The samples will, upon the closing of the International Exhibition, be forwarded to Mr. Bessemer, the well-known inventor of a process of steel manufacture, by whom they will be subjected to a series of tests to ascertain their value.

Some specimens of iron are exhibited from the back of the main lode of Cadiangullong mine, where there is also a rich copper mine.

There are also exhibited a few specimens of lead and silver ore. Some of these are from Manar, the property of Mrs. Gordon, near Goulburn; the shaft has been sunk to a depth of eighty feet. The other specimens are from Burrowa, and from Jobbins' mine, near Yass.

A few beautiful specimens of marble are exhibited.

In addition to the above, there is a numerous miscellaneous collection of minerals and rocks. Some building stones are exhibited by Sir William Macarthur, Mr. E. T. Blacket, and Mr. A. Dawson; some native alum by Mr. H. Moss, of Shoalhaven; and some cobalt, by Mr. E. W. Rudden, of the Macleay River.

WINES.—The samples of colonial wines represent all the large vineyards in the colony, with the exception of those in the Murray River district; some samples of these will, however, arrive in time for shipment to England. From the statement of the jurors who tasted the wines, it would appear that the samples now sent home are fully equal to those which took so high a position at the Paris Exhibition; a no less favourable report of the wines is consequently expected. Sir W. Macarthur exhibits a large variety of the white, red, and muscat wines from the Camden vineyard. Mr. J. E. Blake sends several varieties of his white and red Kaluda. Mr. A. Windeyer, of Kinross, exhibits hermitage red and Madeira white. The principal other samples sent are—porphyry white, exhibited by Mr. Henry Carmichael, Seaham; Verdeilho and claret by Mrs. Bettington, Oatlands; red and white by Mr. A. L. McDougall, Baulkham Hills; red and white Cawarra by Mr. H. L. Lindeman; and Wivehoe Madeira by the Hon. Charles Cowper.

SPECIMENS OF COAL.—A collection of mineral specimens, illustrating the various coal formations, was contributed by Mr. W. Keene, Examiner of Coal Mines. The specimens are between two and three hundred in number, and represent the several beds that have been gone through in search for coal, commencing with the sandstone and ending with the granite, each of the beds being represented by characteristic specimens.

MODELS.—Several models of various kinds were exhibited, the most noticeable of which were those of improvements in railway construction. The principal of these was the model of a structure, called a "key bridge," designed by T. Woore, and executed by Messrs. James and Davis. The distinguishing feature of the key bridge is stated to be "a new disposition of timber struts arranged in a series of triangles to form a trussed beam, in such a manner that the strain rests solely on the longitudinal fibre of the timber, and that the whole is incapable of longitudinal expansion."

Mr. Woore also contributed a model showing a new mode of supporting iron rails.

A model of a horse railroad and carriage was exhibited by the inventor, Mr. Peter Brawen.

A model of the Sofala diggings—the first gold-field discovered in Australia—was constructed under the direction of the Commissioners, by Mr. J. C. Low, the author of a large and elaborate model of Ballarat exhibited in Melbourne last year. The model is on a scale of forty feet to the inch, its size being ten feet by six, and the area comprised a mile by half a mile.

CABINETWARE.—The specimens of cabinetware exhibited were few in number, but some of them are of great merit, both as regards design and workmanship.

THE FINE ARTS.—The few oil and water-colour paintings forwarded to the International Exhibition will prove that the fine arts are cultivated here with considerable success. The most striking of these oil paintings is an excellent portrait, by Claxton, of the late Archdeacon Cowper. Mr. O. R. Campbell exhibits a view from the North Shore. The other two pictures in oils, also views of colonial scenery, are by Mr. W. Davis, of Pymont, and

by Mr. T. A. Newall. Eighteen water-colour drawings are exhibited.

The photographic pictures sent to the Exhibition demonstrate the perfection to which the photographic art is cultivated in Sydney. Some few pictures have been taken expressly for transmission to England; but generally the photographers have contented themselves with the exhibition of their old productions. All the popular styles of portraiture are represented, and creditable specimens are shown both of portraits on glass coloured, and of paper pictures. Mr. Dalton has forwarded six or seven portraits of aborigines and half-castes admirably photographed.

MISCELLANEOUS ARTICLES.—First, amongst the articles not above enumerated ought to be mentioned several exquisite specimens of work in precious metals, designed and manufactured by colonial artificers. The specimens of account books, book publishing and binding, displaying a high degree of taste and superior workmanship. The manufactures of articles from leather are numerous and beautiful, the principal specimens being saddles, harness, and boots. The manufacture of textile fabrics is represented chiefly by colonial tweed and by clothing made therefrom. Amongst other manufactured articles creditably represented, may be mentioned potteryware, sugar and confectionery, soap, candles, and blacking. The other miscellaneous articles are numerous, and very varied in their character, including some interesting collections of objects of natural history and aboriginal implements.

Home Correspondence.

THE COLONIES.

SIR,—I intended when at the meeting of Wednesday 26th March (but was prevented by the press of speakers) to have said a few words in corroboration of what appears to be the leading idea of Mr. Ashworth, as regards colonial views and tactics, namely, that although the colonies do very willingly receive the payment of their Governmental expenses from the exchequer of Great Britain, yet, in general, their measures of public policy are dictated by a regard to their own interests, without due consideration for those of Great Britain; and further, that in practice the imperial colonial administration is quite powerless to prevent the interests of Great Britain being thus dealt with. And my corroboration of this would be the instance of the extraordinary patent law of Canada, which enacts that a legally settled inhabitant of the province may have a patent for his own invention, or for an invention imported from any country save the United Kingdom and the United States of America; but no other subject of her Majesty, nor citizen of the United States, shall have a patent for an invention in Canada. This was passed by the Canadian legislature, and approved by the imperial Government, as was also a unique clause, contained in the same act of the legislature, that any man who should have a patent granted to him in Canada should put on every article sold or issued by him a statement that it was so patented, or be liable to a fine and imprisonment, like any other criminal! As regards our general colonial administration here, it is to be remarked that, although we have now separate patent laws in many of the colonies, yet the Colonial office declines to do anything to facilitate the British patentee extending his rights thereto, leaving him to encounter difficulty and expense, just as if the colonies were so many foreign states over whom we could exercise no influence. I am, &c.,

J. W. CAMPIN.

London, 31st March, 1862.

PARAGUAY.

In the great array of countries, large and small, which will be represented at the forthcoming International Exhibition, one will be wanting which had an honourable place

in the Great Exhibition of Paris of 1855, and I trust it may not be uninteresting to show what that country is, and wherefore she will not be represented.

Paraguay, one of the central States of South America, is a country with which we are as yet but imperfectly acquainted, but which has many claims to our consideration and sympathy. For a long time under the domination of the Spaniards, by whom it was discovered in 1515, Paraguay became a favourite centre of Jesuitical influence, until at last, in 1811, with the growth of national sentiment, a pacific revolution was accomplished, and she constituted herself into an independent republic. Meeting, however, the opposition of all the surrounding states, Francia, by whose indomitable will the revolution was effected, resolved at all costs to defend the sovereignty of Paraguay, and for that purpose resorted to the strange expedient of shutting up the country for nearly thirty years from all contact with other nations. This policy of estrangement was, of course, highly prejudicial to Paraguay, and at his death, in 1840, it underwent a complete change.

Don Carlo Lopez, the first and present president of the republic, is a man of great ability and energy, and of liberal and expanded views, and he soon introduced Paraguay into the family of civilised states, opening her ports to every country, and entering into regular treaties with European and American States; and at this moment the president and people are working together in raising that little republic to a position of dignity and prosperity.

The limits of Paraguay are well defined by the great rivers by which she is surrounded, and which separate her from the Argentine Republic, Brazil, and Bolivia. The population is small, being scarcely half the population of London; and the capital of the republic, Asuncion, has only 50,000 souls. There are three distinct races in Paraguay. There are the Indians, of American origin; the whites, of European origin; and a few negroes, of African origin; and, by a mixture of races, there are besides the Mulattoes and Creoles. The Indians belong to many nations, but the Guaranies occupy a vast territory in South America, and their language still prevails extensively in Paraguay. This language presents many features of extreme interest. Naturally very observing and imitative, as all primitive nations, the Guaranies formed their language by using the noise of things or the cries of animals as signs for ideas, and they succeeded in creating words whose vocal sounds represent the impressions of the mind working upon the senses.

The climate of Paraguay is warm and dry, the temperature varying from 71° in June, or winter season, to 90° to 100° in January, or in summer. The Paraguayans are generally well constituted and sufficiently robust, of middle size, and light complexion. Most of them have dark eyes and hair, and beard of the same colour. They are not so strong as the Europeans, but they are light and supple, and generally enjoy good health and attain an advanced age. As a whole the country may be considered healthy. Fever is very rare, and typhus is not known.

And now as to the productions.—In the mineral kingdom Paraguay abounds in iron, marble, and copper. Mercury is also found, and it is quite possible that gold may yet be discovered. The vegetation of Paraguay is beautiful and vigorous; and as to the animal kingdom, though not so rich as European States, she has a large variety. There are the caraya, or simia belzebuth, the wild pig, the deer, the jaguar, or American tiger, and the puma, or American lion. She has numerous birds, reptiles, fishes, and insects in great variety. Horses and cattle are most abundant. Agriculture is the principal industry of the inhabitants. Of tobacco they succeed in getting three crops a-year, and the quantity produced exceeds 15,000,000 lbs. Manioc, or tapioca, a root used as potatoes in this country, is largely cultivated. The cultivation of sugar has made but little advance. Cochineal is most abundant. Cotton grows almost spontaneously, and

may become a most important article of export. The quality is excellent. A sample of Paraguayan cotton was sent last year to the Antwerp Chamber of Commerce, which reported that the staple was long and fine, and very like Brazilian cotton, and of the best quality. The culture of Paraguayan tea, or yerba maté, is very important, but belongs exclusively to the Government, which gives it out as a monopoly. Hides are plentiful, and there are numerous tanneries. The foreign commerce of Paraguay has been much retarded by the bad administration of De Francia, but it is now acquiring some degree of importance. The shipping entered and cleared to and from the port of Asuncion has more than doubled between 1852 and 1858, from 10,000 tons to 21,000 tons, and the imports and exports of that port have also doubled, from £200,000 in 1852, to £430,000 in 1858. Eventually, Paraguay will be able to export jute, indigo, and other dyeing materials; and cotton especially, to which the attention of the Government is earnestly directed, will become a most valuable product.

Such is the general position of Paraguay at this present moment. The country is, no doubt, in its infancy. The victim of misgovernment and of Jesuitical intrigues, she has been kept back for a long time, and she is only now discovering what resources she possesses, and what position she is capable of achieving. But she has much to contend with. At this moment she has no representative in this country, and her relations with her Majesty's Government have been suspended. The cause of such a rupture is truly insignificant, yet it is far from satisfactory for that government to be at issue with Britain. A certain Santiago Canstatt (another Don Pacifico) went, in 1852, to Paraguay with a passport of the Uruguayan Republic. He was born at Montevideo, of a Uruguayan mother and a British father naturalised in that country. For five years he continued to pass as a Uruguayan subject, but in 1857, upon his return from a journey to Buenos Ayres, he presented himself as a British subject. Two years after this, he, with other persons, was arrested in Paraguay for conspiracy, and for an attempt to assassinate the chief of the republic, and immediately Mr. Henderson, the British consul at Asuncion, protested against the manner in which Canstatt was arrested. Afterwards Canstatt found means to communicate with the British consul and called for his interference and protection. The consul again called the attention of the Minister for foreign affairs to the subject, but the Paraguayan Government, being hurt at this interference on the part of a foreign consul with the regular execution of the law, refused to listen to his representation, and insisted in dealing with Canstatt as with any other Paraguayan subject; whereupon Mr. Henderson, having communicated with the British Government, received orders to demand, 1st, The immediate liberation of Canstatt and a compensation adequate to the sufferings he had undergone, and the injury done to his interests and his property; 2nd, A complete apology on the part of the Government of Paraguay towards the Government of her Majesty, for the want of deference to the representations addressed by the consul. Notwithstanding these demands, Canstatt and his accomplices were tried and found guilty, and five of them, including Canstatt, were sentenced to death; but after the trial, the President of the Republic saw fit to set at liberty Canstatt and eleven of the conspirators. This is the incident which led the British Government to suspend all relations with Paraguay. I shall not enter into the merits of the case, but simply suggest, that supposing the inverse case had happened, and a Paraguayan subject was apprehended in this country for felony, the British Government would never allow either a foreign consul or a foreign ambassador to stand in the way of the regular course of justice as administered by British tribunals and according to British law. Canstatt, moreover, was really not an Englishman. He was born at Montevideo, and, as such, a subject of Uruguay; and though his father was a British subject, Paraguay had reason to dissent from the opinion that the British law

can wrest him from the law of the country where he was apprehended for crime. The British Government, however, thought otherwise. The consul withdrew. Reprisals were committed, and though the real subject of dispute has long ago been settled by the liberation of Canstatt, the British Government has not yet re-entered into communication with Paraguay. On the other point arising out of this question, as to whether the Paraguayan Government were right in refusing to deal with the British consul at all, I shall not pronounce an opinion. Doubtless the consul is generally no more than a commercial agent, and it is only where he has also power to deal as a chargé d'affaires, that he can presume to hold diplomatic intercourse with the Government of the country where he resides, yet where no minister of higher rank is present, it may be presumed that he is obliged to apply for redress whenever his co-nationals have been injured. A claim has been made against the Paraguayan Government in consequence of the running down of a British steamer by a Paraguayan war steamer, but that government is quite disposed to leave this dispute to arbitration, and to act generously should it be found that there was any fault on their part. I refer to these points with no intention to give a formal judgment on the question, but merely as a matter of interest illustrative of the nature of our present relations with Paraguay; and more especially to show that, although Paraguay will send nothing to the Exhibition, she possesses much that might be of extreme interest and value to all commercial nations.

I am, &c., LEONE LEVI.

10, Farars-buildings, Temple, April 7th, 1862.

Proceedings of Institutions.

YORKSHIRE UNION OF MECHANICS' INSTITUTES.—The annual meeting of delegates from the several Institutes in this Union and other friends of education, will be held on the 23rd April, at Batley and Dewsbury. The conference of delegates will be held in the forenoon at Batley, under the presidency of Edward Baines, Esq., M.P.; the dinner will take place in the Town-hall at Batley; and in the evening there will be a public meeting in the large Music-hall at Dewsbury. Richard Monckton Milnes, Esq., M.P., will preside, and amongst those who have accepted invitations to be present are J. Dent Dent, Esq., M.P., W. J. S. Morritt, Esq., M.P., Edward Baines, Esq., M.P., J. P. Brown Westhead, Esq., M.P., Hugh C. E. Childers, Esq., M.P., the Mayor of Leeds (Jas. Kitson, Esq.), the Mayor of Halifax (John Crossley, Esq.), E. Wheatley Balme, Esq., the Rev. A. Cassels, S. Colbeck, Esq., W. Lipscomb, Esq., &c. The second day is usually devoted to recreation, and the Local Committee have made arrangements for an inspection of some of the large manufactories for which Dewsbury and Batley are celebrated, as well as a visit to Calder Reformatory and other objects of interest. Great exertions are being made by the Committee of Management to give *éclat* to the annual celebration of the Yorkshire Institutes, and a successful meeting is confidently anticipated. The railway companies have consented to allow the delegates to have the privilege of obtaining return tickets at a single fare.

MEETINGS FOR THE ENSUING WEEK.

- MON.**.....Geographical, 8½. 1. M. Bensusan, "The Fiji Islands: their Commercial Resources, &c." 2. Dr. B. Seemann, "Report on the late Government Mission to the Fiji Islands."
Medical, 8½. Dr. Habershon, "On some Cases of Typhus Fever."
TUES....Civil Engineers, 8. Continued Discussion upon the Papers by Mr. Brunles and Capt. Galton, on "Railway Accidents."
 Statistical, 8. Mr. Frederick Purdy, "On the Earnings of Agricultural Labourers in Scotland and Ireland."

- Pathological, 8.
 Ethnological, 8. Mr. G. M. Tagore, Professor of Hindu Law at University College, London, "On Buddhism."
 WED. ... Geological, 8. 1. Professor Huxley, "On some new Labyrinthodont Reptiles from the Edinburgh Coalfield." 2. Mr. W. Whitaker, "On the Thinning-out of the Eocene Strata of the London Basin to the West." 3. Mr. J. Bolton, "On a Fresh-water Deposit beneath the Drift, near Ulverston."
 THURS. ... Linnean, 8. 1. Mr. George Benthams, "On *Monodora*." 2. Dr. T. Thomson, F.R.S., "On Lieut. Beddome's Plants from the East Indian Peninsula." 3. "On the Structure of the Mantle in *Tectacella*." Chemical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

- Par
 Numbr.
 Dated 22nd and 24th March, 1862.
 114. Railway and Canal Bills—Fourth Report from Committee.
 115. Navy (Ships of War)—Return.
 119. Ordnance Surveys—Account.
 120 (1) Education Commission—Papers.
 30. Railway and Canal Bills (137. Dundalk and Enniskillen Railway; 138. Oswestry and Newtown, Llanidloes and Newtown, and Shrewsbury and Welshpool Railway, and Amalgamation, &c.; 139. Waterford and Passage Railway; 140. West Riding, Hull, and Grimsby Railway)—Board of Trade Reports.
 43. Bills—College of Physicians (Ireland).
 49. — Bastardy (Ireland).
 Salmon Fisheries (England and Wales)—First Report of Inspectors.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, April 4th, 1862.]

- Dated 16th December, 1861.
 3062. F. Vetterlin, 14, Scarborough-street, Goodman's-fields—Imp. in breech-loading ordnance, and the projectiles to be used therewith, which may also be applied to small arms.
 Dated 16th January, 1862.
 119. E. H. C. Monckton, Fineshade, Northamptonshire—Imp. in apparatus for obtaining and applying motive power.
 Dated 20th January, 1862.
 149. R. O. Doremus and Bern. L. Budd, New York—Imp. in making cartridges.
 Dated 24th January, 1862.
 188. T. Morris and R. Weare, Birmingham, and E. H. C. Monckton, Fineshade, Northamptonshire—Imp. in submarine and other telegraphic communication and in apparatus connected therewith.
 Dated 4th February, 1862.
 291. C. M. Roullier, Paris—Imp. in the manufacture of straps, bands, chains, and other like articles.
 Dated 6th February, 1862.
 315. P. H. Astley, 4, Matthew's-place, Stratford, Essex, and C. Leighton, 3, Manby-grove, Manby-park, Stratford, Essex—Imp. in the construction of life boats, applicable also to ships' boats, gun boats, and other vessels.
 Dated 13th February, 1862.
 387. R. Hornsby, jun., Spittlegate Works, Grantham—Imp. in apparatus for thrashing, elevating, cleansing, and separating grain, and in apparatus for elevating straw.
 Dated 19th February, 1862.
 439. F. Barnett, 230, Oxford-street—An improved lamp or lantern for street lighting and other purposes.
 441. N. Symons, 6, Cambridge-street, St. Pancras—Imp. in steam-engines for increasing the powers thereof by a different form of piston, internal top and bottom of cylinder.
 Dated 22nd February, 1862.
 475. G. T. Bousfield, Loughborough-park, Brixton—Imp. in apparatus for elevating hay, straw, and earth. (A com.)
 Dated 24th February, 1862.
 494. T. Partridge, sen., 50, Tenby-street, Birmingham—Imp. in apparatus for printing railway and other tickets or cards.
 Dated 25th February, 1862.
 510. J. Whitworth, Manchester—Imp. in manufacturing and preparing projectiles, and in apparatus to be used for those purposes.
 Dated 27th February, 1862.
 540. R. Seager, Ipswich—Imp. in the manufacture of boots and shoes, and in apparatus employed therein.

Dated 8th March, 1862.

619. A. W. Williamson, University College, Middlesex—Imp. in apparatus for generating steam, or for generating and superheating steam.

Dated 10th March, 1862.

648. J. T. Calow, Staveley, Derbyshire—An improved safety apparatus applicable to cages or hoists used in mining or lifting machines.

Dated 12th March, 1862.

678. E. G. Fitton, Ardwick, Lancashire—Imp. in machinery for winding yarn or thread on to bobbins or spools.

Dated 13th March, 1862.

682. L. Vidie, Paris—Imp. in the construction of aneroid barometers, partly applicable to steam gauges.
 683. J. Cunningham and R. Cunningham, Paisley—An improved ornamental fabric, and improvements in weaving and in jacquard apparatus.
 685. G. Ermen, Manchester—An improved receptacle or case for the protection of threads, of cotton, silk, or other fibrous substances when in a "spooled," "balled," or otherwise wound state, or for the reception of "tapes."
 687. J. Wadsworth, Salford, near Manchester—Imp. in the construction and manufacture of moveable or adjustable heels for boots and shoes.
 689. E. T. Hughes, 123, Chancery-lane—Imp. in furnaces for consuming smoke. (A com.)
 691. M. Henry, 84, Fleet-street—Imp. in stuffing boxes.
 693. G. Calvert, Islington—Imp. in casters.
 695. J. B. Howell, Sheffield—Imp. in the manufacture of chains and chain cables.
 697. W. E. Newton, 66, Chancery-lane—An imp. in armour plates for vessels of war. (A com.)
 699. R. Schomburg, 90, Cannon-street, and A. Baldamus, Charlottenburg—Imp. in purifying illuminating gas.

Dated 14th March, 1862.

701. A. Quinard, 15, Passage des Petites Ecuries, Paris—A machine for manufacturing horse-shoe nails.
 703. G. H. Birkbeck, 54, Southampton-buildings, Chancery-lane—Imp. in trusses and bandages, and in pessaries to be used therewith when required.
 704. G. Bennet, 21, Manchester-buildings, Westminster—An imp. in the coating and covering of wrought iron for the purpose of preserving it and preventing oxidation.
 705. G. H. Sanborn, Boston, U.S.—Imp. in gas regulators. (A com.)
 707. G. T. Bousfield, Loughborough-park, Surrey—Imp. in machinery for digging and disintegrating the earth for agricultural purposes. (A com.)
 709. M. A. Muir and J. McIlwham, Glasgow—Imp. in railway sleepers and chairs and in the mode of fixing rails.

Dated 15th March, 1862.

711. A. Coles and W. Coles, Wych-street, Strand—Imp. in the construction of trusses for cases of hernia.
 713. H. Emanuel, Brook-street, Hanover-square—An imp. in the manufacture of ornaments for personal wear.
 715. G. B. Petit, New Oxford-street—An improved method of, and apparatus for heating water and other liquids, applicable also to the evaporation of liquids.
 716. J. Smadja, 16, Stamford-street—Imp. in bustles and crinolines, and in materials used in their construction.
 717. W. McAdam, Glasgow—Imp. in the manufacture of blocks, pulleys, and weights for window sashes and other purposes, and in the mode of applying the same.
 719. J. Grant, Albion-place, Maidstone—Imp. in the construction of portable railways, and in the trucks or carriages to be used thereon.
 721. S. N. De la Haye de Barbezieres, Paris—An improved construction of horse-shoe.
 723. G. Hamilton, 6, Willow-terrace, Islington—Imp. in tumbler blocks.
 725. W. Pickstone, Radcliffe, Lancashire—Imp. in the manufacture of piled fabrics.

Dated 17th March, 1862.

727. W. Clark, 53, Chancery-lane—Imp. in water meters. (A com.)
 731. L. P. Mongruel, 7, Rue Vivienne, Paris—An improved cold vapour generator, which may also be used in the carburation of illuminating gas.
 733. G. Davies, 1, Seale-street, Lincoln's-inn—Improved apparatus for drawing. (A com.)
 737. W. Barber, Stockport—Imp. in the manufacture of hats.
 739. J. M. Courtaud, Baintree, Essex—Imp. in power looms.
 741. E. Smith, Carlisle-street, Soho—An imp. in watch keys.
 743. T. Waller, Conduit-street West—Imp. in breech loading fire-arms. (A com.)

Dated 18th March, 1862.

747. M. A. F. Mennons, 39, Rue de l'Échiquier, Paris—The application to the manufacture of paper pulps of a vegetable product not hitherto used for that purpose. (A com.)
 749. J. Banks, 19, Salisbury-street, Adelphi—Imp. in electromagnetic telegraph printing apparatus or marking instruments, and the instruments or apparatus to be used in connection therewith.
 750. H. Bailly, 5, Salter's Hall-court, Cannon-street—Imp. in the manufacture of paper from wood, and in apparatus used therein. (A com.)
 751. T. Dunn, Windsor bridge Iron Works, Pendleton—Imp. in the construction of bridges, roofs, houses, and other structures.

753. C. Iles, Birmingham—Imp. in the manufacture of umbrellas and parasols.
755. J. A. Jaques and J. A. Fanshawe, Tottenham, Middlesex, and F. Jaques, Droylesdon, Lancashire—Imp. in the construction of elastic surface rollers.
757. J. Wright, 42, Bridge-street, Blackfriars, and H. Wheatcroft, 27, Fore-street—Imp. in apparatus or machinery for lasting and making boots and shoes.
759. F. Warner, 8, Crescent, Cripplegate—Imp. in cocks and taps.
761. J. T. Buck, New North-road—Imp. in instruments and work cases known as "Ladies' companions."

Dated 19th March, 1862.

765. R. Wilson, Patricoft, near Manchester—Imp. in hydraulic presses, and in machinery or apparatus for raising or forcing fluids.
767. R. A. Brooman, 166, Fleet-street—Imp. in printing and painting upon glass and ceramic wares and upon metallic and mineral substances, also in the preparation of inks and colours for printing and painting. (A com.)
769. R. A. Brooman, 166, Fleet-street—Imp. in rotary engines. (A com.)
771. J. Cumming, Edinburgh—Imp. in the method and apparatus for distributing and setting up type.
772. G. M. Todd, 84, Hackney-road—Imp. in shuttle sewing machine, and the production of a new kind of stitch thereby.

Dated 20th March, 1862.

774. J. G. T. Campbell, 1, Hatcham-terrace, Old Kent-road—Certain imp. in ships' propellers.
778. E. Field, Buckingham-street, Adelphi—Imp. in apparatus for regulating the flow of gaseous and other fluids.

Dated 21st March, 1862.

788. J. Humphreys, Tower-hill—Imp. in steam engines.
790. W. Phelps and W. R. Lymbrey, Nottingham—An improved woven fabric, and imp. in machinery for manufacturing the same.
792. W. Clark, 53, Chancery-lane—Imp. in sewing machines, which improvements are also applicable to other machinery for giving a rotating motion always in the same direction. (A com.)

Dated 22nd March, 1861.

794. T. Marsh, West Bromwich, Staffordshire—An imp. or imps. in hames for horses and other draught animals.
796. E. Owen, Bala, Merioneth, North Wales—Certain imp. in the hydraulic engines known as "turbines."
798. J. Davis, Kennington—Imp. in wind musical instruments.
800. F. W. Colls, Deptford, and P. Haden, Hackney—Imp. in consuming smoke, and in the apparatus connected therewith.
802. J. G. Jennings, Holland-street, Blackfriars-road—Imp. in the manufacture of biscuits.
804. T. F. Hale, Bristol—Imp. in valves.
806. G. Hartshorne, jun., and D. G. Ward, Dudley, and W. Wooley, Tipton—Imp. in punching or perforating metal plates or sheets, and in apparatus or machinery to be employed for that purpose.

Dated 24th March, 1862.

810. T. White, Birmingham—Imp. in the manufacture and ornamentation of nut crackers and lobster crackers.

Dated 25th March, 1862.

822. A. Fryer, Manchester—Imp. in the manufacture of sugar, and in separating liquids from sugar and other substances.
824. T. Guibal, 43, Rue des Groseilles, Mons, Belgium—Imp. in the construction of ventilators for the ventilation of mines and furnaces.
828. W. Clissold, Dunbridge Works, near Stroud—Imp. in carding engines.

Dated 26th March, 1862.

830. L. De la Peyrouse, 13, Pantion-square—Imp. in the preservation of animal substances.
832. J. Wilson, Glasgow—Imp. in the apparatus used for and in the method of hot-pressing or finishing plaids, shawls, handkerchiefs, and other woven fabrics.
834. W. J. Taylor, 5, Upper Church-street, King's-road, Chelsea—An improved method of colouring Portland cement for plain and ornamental plasterer's work on the walls of buildings and other erections.
836. R. Boby, Bury St. Edmunds, Suffolk—Imp. in hay-making machines.
838. J. Taylor and C. H. Minchin, Manchester—A suspender or improved gallery for supporting the shades of gas or other lights.
840. R. Griffiths, 69, Mornington-road, Regent's-park—Imp. in weapons of warfare for naval purposes.

Dated 27th March, 1862.

844. W. Greenway, Birmingham—Imp. in the manufacture of bolts for fastening doors and for other like purposes.
846. T. G. Greenside, 6, Penton-place, Kennington-road—Imp. in window-sashes.
848. R. Edwards, Regent-street, Mile-end—Imp. in machinery and apparatus for pulverising, stamping, and washing mineral, animal, and vegetable substances.
850. J. Lock, Narrington, Northamptonshire—Imp. in apparatus for raising or elevating straw and crops on to stacks.
854. R. De Bary, Finsbury-square—Imp. in machinery for the manufacture of cigars. (A com.)
856. W. E. Gedge, 11, Wellington-street, Strand—Imp. in apparatus for extinguishing fire. (A com.)
858. J. H. Johnson, 47, Lincoln's inn-fields—Imp. in threshing machines. (A com.)
860. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in producing imitation mosaics. (A com.)

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

847. F. Tolhausen, 17, Faubourg Montmartre, Paris—New or improved cigar-tubes or apparatus for holding and smoking cigars and cigarettes. (A com.)—March, 1862.
893. J. P. Woodbury, Boston, U.S.—An imp. in arming war vessels.—31st March, 1862.
910. M. Henry, 84, Fleet-street—An improved furnace for treating iron ore. (A com.)—1st April, 1862.

PATENTS SEALED.

[From Gazette, April 4th, 1862.]

- | | | |
|---|---|-----------------------------------|
| <i>April 4th.</i> | 2505. J. C. Willsher. | 2584. W. Welch. |
| 2510. W. Simpson. | 2514. R. W. Sievier. | 2605. H. Macmeikan. |
| 2516. W. Smith. | 2521. H. B. Coathupe and F. H. Waltham. | 2623. J. T. Smith. |
| 2531. C. W. Felt. | 2544. N. Stram. | 2700. G. M. Gilbert. |
| 2533. L. Christoph, W. Hawksworth, & G. P. Harding. | 2561. B. Taylor and C. Edkins. | 2822. W. E. Newton. |
| 2544. N. Stram. | 2562. F. B. Houghton. | 2855. W. L. Balmain & J. Kean. |
| 2573. F. B. Baker. | 2574. T. Forster. | 2877. E. Loomes. |
| | | 3009. T. Ellis. |
| | | 3182. W. Tate. |
| | | 3202. G. T. Bousfield. |
| | | 3225. F. Laurent and J. Castelaz. |
| | | 36. G. T. Bousfield. |
| | | 127. N. Thompson. |
| | | 191. J. Alison. |

[From Gazette, April 8th, 1862.]

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|----------------------|-----------------------|---------------------------------|
| <i>April 8th.</i> | 2534. B. Browne. | 2743. B. Mitchell & W. Brunton. |
| 2549. J. C. Ramsden. | 2559. H. J. Distin. | 2784. G. T. Bousfield. |
| 2564. J. Flinn. | 2619. H. Bloxham. | 2786. H. D. Bradt. |
| 2624. E. Oldfield. | 2680. B. J. La Mothe. | 2841. W. E. Newton. |
| 2703. O. Bayliss. | | 2907. B. D. Godfrey. |
| | | 3041. W. E. Newton. |
| | | 3191. J. Westwood. |
| | | 3221. A. V. Newton. |
| | | 217. J. Hunt. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, April 4th, 1862.]

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|--------------------|-------------------|------------------|
| <i>March 31st.</i> | 832. M. Coupland. | 866. A. Chaplin. |
| 845. D. B. White. | | 1098. J. Childs. |

[From Gazette, April 8th, 1862.]

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| <i>April 2nd.</i> | 830. A. Paget. | 873. J. T. Pitman. |
| 846. E. Morewood. | 889. J. H. Young. | 883. W. Henderson. |
| 1124. J. Scholfield and W. Cudworth. | 850. E. Fairburn. | 935. J. Luis. |
| <i>April 3rd.</i> | 853. G. F. Chantrell & E. Dutch. | 957. W. E. Newton. |
| 862. W. Owen. | | <i>April 5th.</i> |
| | | 863. J. Rogers and E. J. Tweed. |
| | | 881. W. Hooper. |
| | | 933. J. Hughes, W. Williams, and G. Leyshon. |
| | | 996. H. Rawson. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, April 8th, 1862.]

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|-------------------|---------------------------------|
| <i>April 1st.</i> | 736. W. Lund and W. E. Hipkins. |
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LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietor's Name.	Address.
4462	April 7.	{ A Fastening for Purses, Bags, Pocket-books, and other articles ... }	Silber and Fleming...	56, Wood-street, E.C.
4463	" 8.	{ Bayley's Improved Acoustic Cornet ... }	John Bayley ...	57, New King's-road, Chelsea, S.W.
4464	" "	{ Bayley's Improved Acoustics for Musical Instruments ... }	John Bayley ...	57, New King's-road, Chelsea, S.W.

Journal of the Society of Arts.

FRIDAY, APRIL 18, 1862.

THE NATIONAL MEMORIAL TO THE PRINCE CONSORT.

It will be remembered that the Council addressed a Circular Letter* to all the Institutions in Union, asking for subscriptions to this Memorial. The following have been received:—

Sheffield Literary and Philosophical Society (voted)	£5	5	0
Braintree and Bocking Literary and Mechanics' Institution (voted)	3	3	0

WINCHESTER MECHANICS' INSTITUTION.

Rev. C. Walters, M.A. (President)	1	0	0
J. Bonham Carter, Esq., M.P.	1	0	0
Mr. R. Hayles (Vice-President)	0	10	0
„ H. W. Frampton (Vice-President)	0	5	0
„ Knowles (Secretary)	0	5	0
„ Tanner (Treasurer)	0	5	0
„ H. Newman (Curator)	0	5	0
„ Duke	0	5	0
„ Hughes	0	5	0
„ Norris	0	5	0
„ Dimes	0	5	0
„ E. Corfe	0	5	0
„ H. Wyeth	0	5	0
Rev. W. Thom	0	5	0
Sundry sums	1	15	0
	£7	0	0

FARNHAM YOUNG MEN'S ASSOCIATION.

The Lord Bishop of Winchester (President) ...	£2	0	0
The Ven. Archdeacon of Surrey (Vice Pres.) ..	1	0	0
Rev. W. T. Jones, M.A. (Librarian)	0	10	0
Mr. R. Mason (Treasurer)	0	10	0
Mr. R. O. Clark (Secretary)	0	5	0
Rev. R. H. Borradaile } (Members of	1	1	0
Rev. F. Paynter } Committee)	0	10	6

MEMBERS.

Mr. Kingham	0	5	0
Mrs. W. Stevens	0	10	0
Mr. Potter	0	5	0
Mrs. A. Stevens	0	5	0
Mr. S. Sampson	0	10	0
Col. Luard	0	5	0
Capt. Luard	0	5	0
Miss Hollest	0	5	0
Mr. W. Hollest	0	5	0
Mrs. Schröder	1	0	0
Miss Schröder	0	10	0
Mrs. Stewart	0	5	0
Mr. & Mrs. Scott	0	5	0
Mr. T. A. Seawell	0	10	0
Mr. H. H. Allen	0	10	0
Mrs. H. H. Allen	0	10	0
Capt. Newcome	0	10	0
Various sums under 5s.	4	10	1

£17 1 7

Paid Collector 0 5 0

£16 16 7

Communications have been received from other Institutions stating that Subscription Lists have

* See present Vol. of *Journal*, p. 137.

been opened, but a Committee having been organized at a Meeting held at the Society's house on the 10th inst. (see last *Journal*), it is requested that any further subscriptions be forwarded to that Committee. The remittances should be by crossed cheque on a London Bank, or by a Post-office Order on the Charing-cross Post-office, made payable in either case and addressed to Samuel Thomas Davenport, Assistant Treasurer, Society of Arts, Adelphi, London, W.C.

CONVERSAZIONI.

The Council have arranged for three conversazioni at the South Kensington Museum during the time of the International Exhibition; the dates fixed are Wednesday, the 7th May, the 9th July, and the 8th October.

Cards will shortly be issued to members of the Society, with the privilege of introducing a lady. Invitations will also be sent to Her Majesty's Commissioners, the Guarantors, the Foreign Commissioners, Jurors, the principal exhibitors, and others connected with the International Exhibition.

INTERNATIONAL EXHIBITION of 1862.

SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £449,300, have been attached to the Deed.

OPENING CEREMONY ON 1st MAY.

Guarantors and others invited to be present at the Opening Ceremony on the 1st May, have the option of appearing in uniform, official, or court dress, or in private morning dress; and according to their choice of dress, so will they be placed in reserved seats. Ladies will appear in morning dress, and will not be separated from the gentlemen by whom they are accompanied.

By order of

Her Majesty's Commissioners,

F. R. SANDFORD, Secretary.

The statement that any kind of half mourning has been prescribed to ladies is wholly unauthorised.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

So much progress has been made in the arrangements during the past week, that to chronicle them within the short limits of this article is simply a matter of impossibility. The building itself, with its decorations, is completed, and all the scaffoldings, which for so long a time have obstructed the view, are removed, so that there is some difficulty in recording anything which may be interesting to the readers of the *Journal*.

Perhaps it may be as well to commence a brief sketch of the Exhibition as it will be seen when opened, marking only those prominent objects which will immediately strike the visitor.

During the time that the Exhibition is open there will be three entrances for the public; the central entrance in the Cromwell-road, which is to admit to the Picture Galleries; the main entrances in the Exhibition and Prince Albert's roads will be used for the Industrial portion.

At present the entrance to the building which is most in use for the admission of visitors and exhibitors, is the one in the south-eastern tower opening into the Cromwell-road. Entering by this door, a view is at once obtained down the corridor underneath the picture gallery, as far as the central hall. This space, which is ultimately to contain carriages, is at present filled with packing cases; a small portion only, at the eleventh hour appropriated to the productions of the United States, bears evidence of forming a part of the Exhibition by a partial display of goods. The rest will continue for some few days to resemble a storehouse, as the carriages, being easily arranged in their places, will be among the last of the goods to come into the building.

Turning round to the right, through the first arch, we find ourselves at the southern extremity of the eastern transept. Immediately in front are the castings of the Coalbrook Dale Company, which will form a great feature of the Exhibition. In their present condition, swathed as they are in wrappings of paper and straw, it is almost impossible to see what they consist of. Beyond them, following the course of the transept, are a set of bells, by Messrs. Warner, and a clock by Mr. Dent. Next is the beautiful trophy of Mr. Bessemer, containing steel goods, in all stages of manufacture, to illustrate his patent process. Then comes a lofty tower, bearing a peal of steel bells, manufactured by Messrs. Naylor and Vickers, of Sheffield, apparently a new application of the metal; and on the same parallel a trophy is being erected of ornamental metal work, by the principal manufacturers of the metropolis. Then follows the screen, made by Mr. Skidmore, of Coventry, for Hereford Cathedral. This beautiful specimen of Art manufacture will, with a tomb in front of it and a chandelier slung from the great rib of the roof, both in metal,

form a magnificent object, as seen from the dais underneath the dome.

The space on the east side of the transept abutting on the offices and underneath the gallery, is cut up by the columns into a series of bays. These have been made into separate enclosed courts, courts, which have been assigned mostly to individual exhibitors. Here Messrs. Hardman, of Birmingham, and Messrs. Hart, of London, are each busy fitting up one of these bays as a Mediæval Court with ecclesiastical furniture and decorations. Close behind them is a bay appropriated to the exhibition of chandeliers and lamps. Between them and the dome, also underneath the gallery, is the space occupied by the objects of Class 10-C, "Objects shewn for architectural beauty," a series of works in stone and plaster of a higher decorative character than those falling under the more generic term of "Building Materials."

We have now arrived, by a flight of steps, at the great dais beneath the eastern dome. The centre of this is occupied by the noble fountain of Messrs. Minton, in Majolica ware. This novel application of the manufacture, and probably the largest work of the kind ever undertaken, will, when finished, form, like the glass fountain in 1851, the great point of attraction in the Exhibition. On the opening day the exigencies of the ceremonial will prevent its being seen to advantage, as the large orchestra, to contain 1,000 musicians, reaches down from the gallery line, and half conceals it. Above the orchestra, but now blocked out by the seats, is the rose window, which has been filled by Messrs. Hartley, of Sunderland, with stained glass.

Commencing from this point, the notice in the *Journal* will next week proceed with the description of the Exhibition.

The following appeared in the *London Gazette* of Tuesday last:—

Whitehall, April 14th, 1862.

The Queen has been pleased to appoint his royal Highness the Duke of Cambridge, K.G.; his Grace the Archbishop of Canterbury; the Lord Chancellor; the Earl of Derby, K.G.; the Lord Chamberlain of her Majesty's Household; Viscount Palmerston, K.G.; and the Right Honourable the Speaker of the House of Commons; to be her Majesty's Commissioners for opening the International Exhibition of 1862, on Thursday, the 1st day of May.

EXAMINATIONS, 1862.—LOCAL EDUCATIONAL BOARDS.

The following is a list of Local Educational Boards corrected for the present year, so far as returns have been received.

It is particularly requested that those Secretaries of Local Boards who have not transmitted a list of their Boards as at present constituted

(whether there be any alteration since last year or not), will immediately do so.

** Those Boards marked thus have been formed this year.

LOCAL BOARD FOR ABERDEEN.

- Mr. H. AMBROSE SMITH, Actuary, Aberdeen, *Chairman*.
 John Cruickshank, LL.D., late Prof. of Mathematics, Marischal College.
 Mr. James S. Brazier, Lecturer on Chemistry, Aberdeen University.
 Robert Beveridge, M.D., Lecturer on Botany and Physiology, Aberdeen.
 Mr. William Rattray, Teacher, Free South Church School, Aberdeen.
 „ David Maver, Teacher, Free Bon-Accord School, Aberdeen.
 „ Peter Cleland, Teacher, School of Art, Aberdeen.
 „ E. Steinkäuler, Teacher of French and German, Aberdeen.

The above constitute the *working* Local Board, in addition to whom, the following gentlemen, being connected with local Institutions for adult evening instruction, are also *ex-officio* members of the Board:—
 The Lord Provost of Aberdeen.
 The Senior Bailie of Aberdeen.
 The Dean of Guild, Aberdeen.

- Mr. David Thomson, Professor of Natural Philosophy, University of Aberdeen.
 Rev. J. Longmuir, LL.D., 15E, North-street, Aberdeen.
 Mr. Alexander Kilgour, M.D., Union-street, Aberdeen.
 „ John Duguid Milne, Advocate, Aberdeen.
 „ James Westland, Banker, 1, King-street, Aberdeen.
 „ John Miller, Manufacturer, Sandilands Chemical Works, Aberdeen.
 „ Hardy Robinson, Manufacturer, Aberdeen.
 „ William Henderson, Sen., Architect, Loch-street, Aberdeen.
 „ William Ramage, Architect, Union-street, Aberdeen.
 „ Th. Melville, Iron Merchant, Gallowgate, Aberdeen.
 „ William Fraser, Surgeon, Union-terrace, Aberdeen.
 „ William Brebner, Manager (E. L. Co.), Flour-Mill, Brae, Aberdeen.
 „ Alexander S. Cook, Merchant, Market-st., Aberdeen.
 „ Alexander D. Milne, Bleacher (Richards and Co.), Rubislaw, Aberdeen.
 „ John Bulloch, Brassfounder, 2, Denburn-terrace, Aberdeen.
 „ John Gray, Engineer (McKinnon and Co.), Aberdeen.
 „ Robert Leys, Engineer, 76, Park-street, Aberdeen.
 „ James Sinclair, Mechanics' Institution, Aberdeen, *Secretary*.

** LOCAL BOARD FOR THE AIRDRIE SCHOOL OF ARTS AND MECHANICS' INSTITUTION.

- Rev. JAMES MCGOUN, *President*.
 „ B. C. Brown.
 „ Wm. Jackson, A.M.
 „ R. W. Lawson.
 „ Matthew McGavin, M.A.
 „ Duncan McNab.
 Mr. Thomas Torrance, surgeon, Airdrie.
 „ James Paterson, surgeon, Airdrie.
 „ John Dalziel, banker, Airdrie.
 „ Hugh Dickie, teacher, Airdrie.
 „ James Boswell, teacher, Airdrie.
 „ Andrew Aitken, ironmonger, Airdrie.
 „ James Forrester, merchant, Airdrie.
 „ John MacArthur, teacher, New Monkhead
 „ Telford Martin, engineer, Airdrie.
 „ Robert Stevenson, engineer, Airdrie.
 „ John Shaw, draper, Airdrie.
 „ John C. Waddell, solicitor, Airdrie.
 „ Thomas Watson, cabinet maker, Airdrie.
 „ William Baird, architect, Airdrie, *Secretary*.

LOCAL BOARD FOR THE ALDERSHOT AND FARNHAM DISTRICT.

- Capt. CHARLES EDWARD MANGLES, Banker, and Chairman of the Royal Mail Steam Company, and of the London and South Western Railway Company. *Chairman*.
 Mr. R. O. Clarke, Surgeon, Farnham.
 Rev. James Dennett, Incumbent, Aldershot.
 Mr. Donald Mangles Dewar, Manager of the West Surrey Bank, Aldershot.
 „ Frederick Eggar, Architect and Surveyor, Aldershot.
 „ Thomas Fabian, Clerk of Works, Royal Engineer Department, Camp, Aldershot.
 „ William Ker, Clerk of Works, Royal Engineer Department, Camp, Aldershot, and Representative of the Aldershot Institution.
 Capt. George Newcome, Justice of the Peace, Aldershot.
 Mr. Ben. Nichols, Solicitor, Farnham.
 „ H. Poppleton, L.C.P., Private Schoolmaster, Farnham.
 Capt. Ross, Dep.-Assist.-Quartermaster-Gen., Aldershot.
 Rev. Dr. Rule, Wesleyan Chaplain, Aldershot.
 Mr. John Seymour, Assistant Manager of the Bank, Odiham, Hants, and Representative of the Mechanics' Institution, Odiham.
 Dr. John Shoolbraid, M.D., Surgeon, Aldershot.
 Mr. Sloman, Surgeon, Farnham.
 „ Charles Stroud, Head Master of the Grammar School, Farnham, and Representative of the Young Men's Association, Farnham.
 The Ven. Archdeacon Utterton, Farnham.
 Mr. Thomas White, Outfitter, Aldershot.
 „ James Wilkins, Clerk of Works, Royal Engineer Department, Aldershot.
 „ William Hollest, Solicitor, Farnham, *Treasurer*.
 „ Barrow Rule, M.C.P., Principal of the Classical and Mathematical School, Aldershot, *Hon. Secretary*.

LOCAL BOARD FOR ASHFORD.

- Mr. R. C. Mansell, Superintendent of the Carriage Department, Ashford New Town Railway Works.
 Rev. J. P. Alcock, Vicar of Ashford.
 „ R. H. Wright, M.A., Grammar School, Ashford.
 Mr. J. J. Cudworth, Superintendent of Locomotive Department, S.E. Railway Works, Ashford New Town.
 „ T. H. Vic, Schoolmaster, Barrow-hill, Ashford.
 „ J. Keener, Accountant, South Eastern Railway Works, Ashford New Town.
 „ R. Rabson, Draper, Church Gates, Ashford.
 „ F. Garaway, Schoolmaster, Ashford New Town, *Secretary*.

LOCAL BOARD FOR BACUP.

- Mr. THOMAS AITKEN, Holmes, Bacup, *Chairman*.
 „ Henry Maden, Rockliffe-house, Bacup.
 „ J. H. Wortall, M.R.C.S., Bacup.
 „ Thomas Newbigging, Bacup, *Secretary*.

LOCAL BOARD FOR BANBURY.

- Rev. HENRY BACK, Vicar, *Chairman*.
 Mr. Thomas Beesley, F.C.S., Banbury.
 „ William Johnson, F.R.A.S. „
 „ J. E. Kirby, Engineer „
 „ R. H. Rolls, Solicitor „
 „ A. B. Rye, F.R.C.S. „
 „ James Stockton, Solicitor „
 „ John H. Beale, Banbury, *Secretary*.

LOCAL BOARD FOR BARNET.

- Rev. FREDERICK C. CASS, M.A., Hadley Rectory, N., *Chairman*.
 Rev. Thomas R. White, M.A., Finchley Rectory, N.
 Rev. John D. Bell, Brunswick-house, Barnet, N.
 Mr. Charles T. Carter, (President of Institute) Hadley, N.
 „ Frank Milne, Hadley, N.
 „ Stephen J. Baldock, (Vice Pres. of Inst.), Barnet, N.
 „ John Thimbleby, Barnet, N., *Secretary*.

LOCAL BOARD FOR BELFAST.

- Mr. JOSEPH JOHN MURPHY, 13, College-square East, Belfast, *Chairman*.
 „ Thomas McClinton, 81, Donegall-street, Belfast.
 Rev. John Scott Porter, 16, College-square East, Belfast.
 Mr. Robert Patterson, 6, College-square North, Belfast.
 Rev. Isaac Nelson, Sugarfield, Shankhill-road, Belfast.
 Mr. Thomas Morrison.
 „ Charles Rainey, 118, Joy-street, Belfast.
 Rev. William C. McCullagh, Ballysillan, Belfast, *Secretary*.
 Mr. F. A. Maitland, *Librarian*.

LOCAL BOARD FOR BERKHAMSTED.

- Rev. J. HUTCHINSON, M.A., Rector of Berkhamsted, *Chairman*.
 „ J. W. Cobb, B.A., Curate of North Church.
 „ F. B. Harvey, S.C.L., Grammar School.
 „ J. R. Crawford, M.A., Master of Grammar School, *Secretary*.

LOCAL BOARD FOR BIRMINGHAM AND MIDLAND INSTITUTE.

- The Right Hon. Sir JOHN S. PAKINGTON, Bart., M.P., Westwood-park, Droitwich, Worcestershire, *Chairman*.
 The Rev. E. H. Gifford, D.D., Head Master of King Edward's School, Birmingham.
 Mr. John Jaffray, Newspaper Proprietor, New-street, Birmingham.
 „ Robert Wright, Accountant, Temple-row West, Birmingham.
 The Rev. Chancellor Law, Warden of Queen's College, Birmingham.
 Sir Francis E. Scott, Bart., Great Barr Hall, near Birmingham.
 Henry Manton, Esq., Great Charles-street, Mayor of Birmingham.
 Mr. Alderman Hawkes, Solicitor, Temple-st., Birmingham.
 „ Alderman Sturge, Corn Merchant, Broad-street, Birmingham.
 „ Councillor Graham, Merchant, Ludgate-hill, Birmingham.
 „ Councillor Smith, Manufacturer, Hill-street, Birmingham.
 „ W. C., Aitken, Clerk of Works, Cambridge-street works, Birmingham.
 „ George Dixon, Merchant, Broad-st., Birmingham.
 „ J. B. Gausby, Merchant, George-street, Parade, Birmingham.
 „ J. B. Hebbert, Solicitor, New-street, Birmingham.
 Dr. T. P. Heslop, Physician, Temple-row, Birmingham.
 Mr. Wm. Mathews, jun., M.A., Estate Agent and Surveyor, Edgbaston House, Birmingham.
 „ C. E. Mathews, Solicitor, Waterloo-st., Birmingham.
 „ Arthur Ryland, Solicitor, Cannon-st., Birmingham.
 „ T. P. Salt, Surgical Instrument Maker, Bull-street, Birmingham.
 „ Henry Wiggin, Refiner, George-street, Birmingham.
 „ J. H. Dance, Brass Turner, 23, Lower Tower-street, Birmingham.
 „ Jas. Russell, Weighing Machine Maker, 32½, Sherlock-street, Birmingham.
 „ Thomas Martineau, Solicitor, Cannon-street, Birmingham, *Secretary*.

LOCAL BOARD FOR BISHOPS' STORTFORD.

- Rev. THOMAS T. L. BAYLIFF, M.A., Vicar of Albury, Herts, *Chairman*.
 Mr. Joseph Bell, M.A., Head Master, Collegiate School, Bishops' Stortford.
 Rev. William J. Copeland, B.D. Rector of Farnham, Essex.
 Mr. E. M. Dillon, M.A., Collegiate School, Bishops' Stortford.

- Rev. Godfrey Goodman, Head Master, High School, ditto.
 „ John Menet, M.A., Chaplain, Diocesan Training School, Hockerill.
 Mr. G. Augustus Starling, M.D., L.R.C.P., Windhill, Bishops' Stortford.
 „ F. Woodham Nash, B.A., Sion house, Birchanger, Bishops' Stortford, *Secretary*.

LOCAL BOARD FOR BLACKBURN.

- Mr. MILES BARON, draper, Northgate, Blackburn, *Chairman*.
 „ Ellis Duckworth, builder, Blackburn, *Vice-Chairman*.
 „ John Bell, goods traffic manager, Blackburn.
 „ James Booth, druggist, Blackburn.
 „ James Garstang, grocer, Blackburn.
 „ John Garstang, schoolmaster, Blackburn.
 „ Robert Hopwood Hutchinson, cotton spinner, Blackburn.
 „ Thomas Livesey, mechanical engineer, Blackburn.
 „ J. H. Margerison, book-keeper, Blackburn.
 „ John Robinson, 31, King-street, Blackburn.
 Dr. J. Withrington, Blackburn.
 Mr. Robert C. Radcliffe, solicitor, Blackburn, *Hon. Secretary*.

LOCAL BOARD FOR BLANDFORD.

- Mr. SPENCE ABBOTT, Draper, &c., West-street, Blandford, *Chairman*.
 „ Edward Fisher, Draper, Market-place, Blandford.
 „ Wellington E. Groves, Pharmaceutical Chemist, Market-place, Blandford.
 „ James B. Green, Architect and Surveyor, Salisbury-street, Blandford, *Secretary*.

LOCAL BOARD FOR BRADFORD.

- Rev. W. R. SMITH, M.A., Incumbent of Christ Church, Hanover-square, Bradford, *Chairman*.
 „ J. R. Campbell, D.D., Independent Minister, Great Horton-road.
 Mr. J. A. Clapham, Manufacturer, Little Horton-lane.
 Rev. H. B. Creak, M.A., Professor of Philosophy and Mathematics, Airedale College.
 Mr. D. J. Crebbin, Schoolmaster, Chapel-street.
 Rev. Daniel Fraser, LL.D., President of Airedale College.
 Rev. S. G. Green, B.A., Classical Tutor, Rawden College.
 Mr. W. Guy, Woolstapler, Marlborough-road.
 Mr. James Hanson, Proprietor of the *Bradford Review*, Great Horton-road.
 „ Jonas Hey, Woolsorter, 1, Edward-street.
 „ J. M. Jaques, Warehouseman, 5, Manor-row.
 Mr. James Law, Stuff Merchant, Claremont.
 „ Charles Lund, Accountant, &c., Darley-street.
 „ J. T. Newbould, Borough Rate Collector.
 „ A. Smith, Warehouseman, 1, Sawrey-place.
 „ S. Smith, Woolsorter, Bedford-street.
 „ M. H. Walls, 66, Victoria-street, Bradford, *Secretary*.

SUSSEX (BRIGHTON) LOCAL BOARD.

- The MAYOR OF BRIGHTON, *Chairman*.
 Mr. James White, M.P.
 „ J. Buchanan, Glasgow.
 Rev. James Walter Cary, D.D., Southampton.
 Mr. Howard Elphinstone, M.A., Hastings.
 Rev. John Griffith, M.A., Brighton College.
 Dr. Jardine, Brighton.
 Rev. J. D. Mozley, B.D., Vicar of Old Shoreham.
 Dr. H. S. Turrell, M.A., Brighton.
 Rev. John Allen, A.B., Brighton.
 „ Albert Creak, M.A., Brighton.
 „ S. R. Drummond, M.A., Brighton.
 „ W. Harvey, Brighton.
 „ Walter Kelly, M.A., Vicar of Hove.
 „ William Porter, Hastings.

Thomas Allen, M.D., Brighton
 Charles Beard, M.D., Cantab: Brighton.
 William King, M.D., Cantab: Brighton.
 Mr. John Andrews, Brighton.
 „ W. R. Barrymore, Brighton.
 „ S. Bastick, Brighton.
 „ John Cordy Burrows, Brighton.
 „ Philip Capon, Brighton.
 „ Charles Carpenter, J.P., Brighton.
 „ Henry Catt, Brighton.
 „ Alderman George Cobb, Brighton.
 „ Alfred Cobbett, Brighton.
 „ Alfred Cox, Brighton.
 „ Samuel Evershed, Brighton.
 „ Robert Folthorp, Brighton.
 „ W. H. Harper, Shoreham.
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Home Correspondence.

MR. WALTON'S PAPER ON ELASTIC GUMS.

SIR,—Mr. Walton, in his paper read at the meeting of the Society, on the 2nd April, has erroneously attributed the work of my brother, Mr. Thomas Hancock, on India-rubber to me, a mistake which I am sure both Mr. Walton and yourself will be glad should be corrected in your next number.

I venture at the same time to offer a few remarks upon what Mr. Walton, in his paper, terms "a new substance, analogous to the elastic and pliable gums, india-rubber and gutta-percha."

For many years I followed the profession of an artist, and the necessity of a substitute for the ordinary oils used in painting strongly forced itself upon my attention. In the year 1842 I commenced a series of experiments with dried linseed and nut oils. During their progress I received many valuable hints from the late Dr. Ure, who, in August, 1843, addressed a letter to the then editor of the *Mechanics' Magazine*, in which he pronounced the application to be a new and valuable discovery.

I painted several pictures and oil sketches with this oxydized oil, all of which have retained a freshness far superior to other pictures, and without the aid of varnish, which I believe to be the most active agent in the destruction of all oil paintings. I have in my collection a picture by the late Sir David Wilkie, which, when it came into my possession, was full of cracks, and the colour peeling off. I applied a thick coat of this compound, which effectually prevented further decay, and imparted a peculiarly clear and beautiful tone, still continuing as fresh as when done some seventeen years ago. Such of my professional brethren as have used it fully appreciate its qualities; and I am inclined to think that many of the old masters, as Paul Brill, Teniers, Ostade, and others, whose works have come down to us so fresh and clear, and free from cracks, must have used a similar if not the same vehicle for their colours.

When gutta-percha first appeared in this country I received from Mr. Henry Gouger, to whom his brother-in-law, Dr. Montgomerie, had consigned it, a supply, and I made the earliest experiments upon the nature and properties of that most valuable material. I have subsequently extended my experiments with the solidified oil referred to, in combination with gutta-percha and caoutchouc, with a view to its application to the insulation of wire for submarine and subterranean telegraphs. The machine for coating telegraph wires, described by Mr. Walton, and in use at the works of the Gutta-Percha Company and my own, was my invention, and patented by me in July, 1848, and by it all the cables now in operation have been covered. No attempt, however, has yet been successfully made to pass this compound of gutta-percha, caoutchouc, and oxydised oil through the machine except by myself, and I believe it to be superior to any insulator yet discovered.

I am, &c.,

CHARLES HANCOCK.

THE SILK TRADE AT FLORENCE.

SIR,—In our *Journal* of March 14th, you inserted a free translation of some notices by M. Maffei, of the silk department of the recent Italian Exhibition, and in my introductory letter I promised to send you some particulars of a scheme therein referred to, for the revivification of that trade in all its branches, which the sanguine projectors deem to be more susceptible of improvement in Tuscany than in any other province of the new kingdom. This they proceed to illustrate by claiming for their native soil an extra share of the favourable climate to which Italy is especially indebted for the superior position which its raw material of silk occupies in the European markets, and for their fellow-countrymen of Tuscany,

their fair proportion of the commercial knowledge, industrial habits, and advanced intelligence, which has enabled the whole kingdom to take its normal position in the family of European nations.

The programme, written, I suspect, by my friend, then appeals with much eloquence and feeling, not only to the patriotism of Tuscany, and especially of Florence, but to the pecuniary sympathy of foreigners; as, however, I fear that with all our respect for that favourite city, my countrymen are scarcely prepared to accept it as an adequate motive for advancing capital towards the realization of the project, I forbear to offer for insertion anything more than the enclosed compressed epitome of the scheme in question; but should any of your readers deem the proposition of sufficient importance to justify further inquiry, I place at your disposal a few copies sent to me for circulation, and shall be glad if they lead to an experimental trial.

I must, however, before concluding, quote, as illustrative of the poetical feeling still latent, and which even the dry details of a commercial programme cannot quench, a passage almost literally translated from the original Italian now before me, in which the readers of it are invited to "hasten the restoration of a noble art, which may once more give employment to the greater part of the population of Florence, and add lustre, as of yore, to this Italian Athens," by taking a substantial interest in the proposed company. I am &c.,

THOS. WINKWORTH.

Gresham Club, April 14th, 1862.

The following is the enclosure referred to:—

The Society for the restoration of the silk trade to Tuscany, to be "*en comandite*," thereby limiting the risk to the nominal value of the shares.

Its objects are—

1. To revive, in that province, the silk industry, from the cocoon to the manufactured article.
 2. To promote the increase and improve the culture of the raw material.
 3. To educate young persons, theoretically and practically, in the trade, in all its branches, by skilled operatives.
- Towards these objects the promoters, Messrs. G. and H. Paradisi, and Messrs. Leopold and Lucian Joseph Maffei have conditionally contracted with the proprietors of the large silk factory, near Florence, known as the "delle Cure," for the purchase thereof.

These premises are sufficiently extensive to afford scope for the application of steam power,

1. To the throwing of the raw material into organzine and tram, and
2. To weaving, where the articles to be produced are susceptible of being profitably worked by that process.

It is also proposed—

1. To have looms in private establishments at Florence.
2. To open premises in that city where the goods produced by the Society can be sold.
3. To deposit samples of the same with retailers.
4. To promote the sale of the goods of the Society, at home and abroad, by the most approved channels.
5. To give or take credit on the safest and most prudent principles; and
6. To carry on the business under the firm of Paradisi and Co., who, with the Messrs. Maffei, are to be the managers of the same, subject to such control as the shareholders may prescribe.

It is proposed to limit the capital in the first instance, but with power to increase it, if deemed necessary, at any future period.

The Prospectus then goes into details as to the rights of the shareholders; the administration by council (or directors, as in England); the division of profits; the mode of dissolution; and many other matters too minute and technical to be understood and appreciated by persons familiar only with the systems and conditions under which joint stock enterprise is carried on in England.

MEETINGS FOR THE ENSUING WEEK.

- MON.....Medical, 8½. Clinical Discussion. Dr. Richardson, "On the Antiseptic Properties of Ammonia."
- TUES. ...Medical and Chirurgical, 8½.
Architectural Museum, South Kensington, 8. Dr. Ermete Pierotti, "On the History of the Temple Area at Jerusalem, with its Buildings and Sub-structures."
- WED. ..Society of Arts, 8. Mr. Samuel Sidney, "On the Effect of Prizes in Improving Manufactures."
Microscopical. 8.
Royal Soc. of Literature, 4. Annual Meeting.
Archæological Assoc., 8½.
- THURS...Philological, 8.
Numismatic, 7.
- FRI.Horticultural, 2.
- SAT.....Royal Botanic, 3½.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par
Nuub.

Delivered on March 26th, 1862.

76. Jersey—Return.
93. Army (Disbanded Foreign Corps)—Return.
117. Sale of Gas—Return.
101. Education Grants—Return.
61. Local Acts (46. Kent Coast Railway; 47. Llanelly Railway and Dock Company; 48. Enniskillen and Bundoran Railway (Extension to Sligo); 49. Newcastle (County Down) Railway)—Admiralty Reports.
44. Bills—Thames Embankment.
59. — Pier and Harbour Act Amendment (amended).
60. — Industrial Schools Acts (1861) Amendment (amended).
46. — Courts of Justice (Money).

Delivered on 27th March, 1862.

120. Educational Commission—Papers.
122. Spirits—Return.
124. Gold (Australia)—Return.
Tariffs (Foreign Countries)—Return.

Delivered on 28th March, 1862.

61. Local Acts (50. Nene Valley Drainage and Navigation Improvements)—Admiralty Report.
108. Metropolitan Police—Accounts.
127. Highland Roads and Bridges—Forty-eighth Report of Commissioners.
128. Plumstead Ordnance Chapel—Return.
58. Joint Stock Companies (Limited)—Return.

Copies of the under-mentioned Papers, presented by Command, will be delivered to Members of Parliament applying for the same at the Offices for the Sale of Parliamentary Papers, House of Commons:—

16. Charity Commissions—Ninth Report.
17. Prisons (Scotland)—Twenty-third Report.

Delivered on 29th and 31st March, 1862.

30. Railway and Canal Bills (141. Kensington Station and South London Junction Railway; 142. Midland Railway (Additional Powers); 143. North Eastern and Newcastle-upon-Tyne and Carlisle Railway (Amalgamation); 144. Scottish North Eastern Railway; 145. Scottish Northern Junction Railway; 146. Sevenoaks Railway; 147. Stafford and Uttoxeter Railway; 148. West Cheshire Railway; 149. West Midland Railway (Merthyr, &c. Lease); 150. West Shropshire Mineral Railway)—Board of Trade Reports.
61. Local Acts (51. Dovey Reclamation; 52. Dundalk and Enniskillen Railway; 53. Aberystwith and Welsh Coast Railway; 54. Sidmouth Railway and Harbour)—Admiralty Reports.

111. Poor Law (Ireland)—Return.
116. Revenue (Ireland).—Accounts.
118. Volunteer Corps—Copies of Memorials.
123. Malting Licences—Return.
125. Registry of Deeds (Ireland)—Return.
129. Mines Commission—Return.
134. Ordnance Survey—Account.

- 112 (5). Civil Services—Estimates (Class 5).
55. East India (Godavery River)—Return.
61. Bills—Chancery Regulation (amended).
62. — Writs of Habeas Corpus into Her Majesty's Possessions Abroad.
63. — Summary Jurisdiction (Ireland).

Delivered on 1st April, 1862.

- 96 (1). Military Education—Supplementary Return.
97. British Museum—Return.
139. Army (China)—Returns.
55. Bills—Netley Hospital Estate.
56. — Education (Scotland).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, April 11th, 1862.]

Dated 27th December, 1861.

3241. P. A. le Comte de Fontaine-Moreau, 4, South-street, Finsbury—Imp. in treating fatty and resinous bodies either in a neutral or acid state. (A com.)

Dated 30th January, 1862.

249. W. Davies, Elizabeth-place, Old Bethnal Green-road—Imp. in apparatus for cutting corks and bungs.

Dated 6th February, 1862.

311. A. C. Bamlett, Middleton Tyas, near Richmond, Yorkshire—Imp. in reaping and mowing machines.

Dated 15th February, 1862.

415. A. H. Harrison, 16, Park place, Highbury—An improved under garment for gentlemen and ladies' wear.

Dated 22nd February, 1862.

478. J. P. D. Camp, 100, Fleet-street—Imp. in the arrangement of valves for steam and other engines, and in the means of operating the same. (A com.)

Dated 25th February, 1862.

507. C. Minasi, 3, St. James's-terrace, Kentish Town-road—Imp. in cartridges, and in apparatus for facilitating the proper aiming with fire arms.

Dated 27th February, 1862.

533. T. Adams, Deptford—Improved arrangements for effecting an equilibrium of the steam pressure upon valves, the said arrangements being also applicable for effecting equilibrium of fluid or gaseous pressure upon other valves.

Dated 8th March, 1862.

625. J. Platt and W. Richardson, Oldham—Imp. in machinery or apparatus for cleaning cotton from seeds.

Dated 11th March, 1862.

656. O. Kerautret and J. Kerautret, 15, Passage des Petites Ecuries, Paris—Imp. in the construction and ornamentation of buildings, by the use of which hewn stone and faced bricks are dispensed with in some parts thereof.

659. T. B. Wilson, Queen's Ferry, Flintshire, and W. Wilson, Preston, Lancashire—Imp. in means or apparatus for the splitting of cane and other fibrous substances.

Dated 12th March, 1862.

665. A. J. Russell, Edinburgh—Imp. in the arrangement of the electric conductors for submarine telegraphs. (A com.)

676. F. Tolhausen, 17, Rue du Faubourg Montmartre, Paris—An improved kind of spinning or humming top. (A com.)

Dated 15th March, 1862.

718. J. Hunter and R. Scott, Coltness Iron Works, Cambusnethan, Lanark, N.B.—Imp. in reaping machines.

Dated 17th March, 1862.

735. B. Todd, Bissoe and Perran Smelting Works, near Falmouth—Imp. in the manufacture of antimony and the oxide of antimony.

Dated 20th March, 1862.

773. B. Samuelson, Banbury—Imp. in chain harrows.

775. A. Hill, Cheddar, Somersetshire—An improved fastening for stays.

777. E. Smith, Sheffield—Imp. in means or apparatus for cutting stone, wood, and other material, which imp. are also applicable to modelling in plastic material.

779. W. Baddeley, Angel-terrace, Islington—An improved method of preparing tobacco for smoking, and in the apparatus to be used for that purpose. (A com.)

781. J. G. Thompson, Porchester-place, Middlesex—Imp. in pianofortes, organs, harmoniums, and other instruments having key boards.

Dated 21st March, 1862.

783. Robert Kay, Castleton Print Works, Lancashire—Certain imp. in the method of printing calico and other surfaces, and in apparatus connected therewith.

785. J. Newall, Bury—Imp. in supplying gas to railway carriages, stations, steamboats, and other vessels, omnibuses, or other carriages, at any required pressure, and in apparatus connected therewith.

786. J. M. Hart, 76, Cheapside, and R. Lavender, 332, Goswell-road—Imp. in means for generating steam.

787. J. Fawcett, Wakefield—Imp. in the manufacture of soap, particularly applicable to the scouring, cleansing, and fulling of woollen or other cloths.

789. Lieut. B. H. Mathew, R.E., St. James's—Imp. in fire arms and in cartridges.

791. J. Warbrick, W. Warbrick, and A. Travis, Dukinfield—Imp. in engines for carding cotton and other fibrous substances.

Dated 22nd March, 1862.

793. D. Abercrombie, Glasgow—Imp. in power looms.

795. T. Fontenay, Grenoble, France—Imp. in smoke consuming furnaces.

797. E. Lord, Todmorden—Imp. in certain machines for preparing cotton and other fibrous substances.
 799. R. Gladstone, Court-Hey, Broad-green, Lancashire—Certain imp. in tilting or tipping waggons.
 801. J. H. Tuck, 35, Cannon-street—Imp. in the manufacture of flexible valves.
 803. T. M. Smith, High-street, Kensington—Imp. in the manufacture of candles.
 805. W. Holiday, Bradford—Imp. in the manufacture of press plates.

Dated 24th March, 1862.

808. J. H. Brierley, Beech hill Mills, Halifax—An improved clasp or fastener for reversible belts, bands, or straps.
 809. J. Clarke, Shifnal, Shropshire—An imp. or imps. in carriage axles.
 811. S. E. Turner, Birkenhead—An improved apparatus for burning a mixture of inflammable gas and air.
 812. C. M. Roullier, Paris—Imp. in flat cables or chains.
 813. B. Fleet, East-street, Walworth—Imp. in apparatus for manufacturing and bottling soda water.
 815. E. Morewood, Stratford, and A. Whytock, Little St. Andrew-street, St. Martin's-lane—Imp. in the process of coating metals, and in the apparatus employed.
 816. W. Henson, Great Alfred-street, Nottingham—Imp. in knitting machinery.

Dated 25th March, 1862.

819. E. Molyneux, jun., Seaview, Enniskerry, Wicklow, Ireland—Imp. in air, gas, and vapour engines.
 820. A. H. Renton, 14, Royal Avenue-terrace, Chelsea, and E. Cotnam, Pimlico—Imp. in apparatus for steering ships.
 821. Lieut. W. Beaumont and J. W. Edge, Manchester—Imp. in sights for rifles.
 823. A. M. Silber, Wood-street—An improved fastening for purses, pocket-books, bags, and other articles. (A com.)
 825. E. Morewood, Stratford, and A. Whytock, Little St. Andrew-street, St. Martin's-lane—Imp. in the manufacture or shaping of iron or other material.
 826. W. Palmer, Sutton-street, Clerkenwell—Imp. in lamps.
 827. C. Culling, Downham-market, Norfolk—Imp. in fire-arms.
 829. J. T. Loft, Berwick-street, Pimlico—Improved machinery for covering strips of metal and wire.

Dated 26th March, 1862.

831. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for cleaning tubes and flues of steam boilers and similar conduits. (A com.)
 833. J. Parker, Huddersfield—Imp. in steam engines, and in apparatus connected therewith. (Partly a com.)
 835. H. Nunn, Chelsea—Imp. in the construction of mangles.
 837. J. Boothman, Gisburn, near Skipton, Yorkshire—Imp. in beehives and apparatus connected therewith.
 839. H. Carr, 4, Victoria-street, Westminster—Imp. in applying lubricating fluids to the journals of railway carriages and locomotive engines.

Dated 27th March, 1862.

842. A. V. Newton, 66, Chancery-lane—An improved process of and apparatus for, separating the fibres of wood, flax, hemp, and other vegetable substances, and extracting the colouring matters therefrom. (A com.)
 852. J. L. H. C. Comtesse de Vernede de Cornellian, Paris—Imp. in treating open cocoons of silk-worms, and in converting the waste resulting therefrom into paper.

Dated 28th March, 1862.

862. J. Jones, Mersey-bank, Warrington, Lancashire—Imp. in apparatus for raising and forcing liquids.
 868. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in chaff-cutters. (A com.)
 870. R. Lubinski, 183 and 185, City-road—An improved method of jointing crutch hooks on umbrellas or walking canes.

Dated 29th March, 1862.

872. J. Boucher, 3, Surrey-villas, Camberwell New-road—Imp. in rifled ordnance and fire-arms, and in the projectiles to be used therewith.
 873. W. Glass, 37, Princes-street, Stamford-street, Lambeth—Imp. in the treatment of sulphuret of antimony, and in obtaining products therefrom.
 880. W. Paterson, Glasgow—Imp. in the manufacture of iodine.
 882. J. Baker, Devonshire-grove, Old Kent-road—Improved alimentary preparations.
 884. J. Platt and W. Richardson, Oldham—Imp. in carding engines.

Dated 31st March, 1862.

886. J. Clinton, 35, Percy-street, Tottenham-court-road—Imp. in flutes.
 888. J. Jordan, Liverpool—Imp. in the construction of armoured vessels or other like structures.
 892. W. H. Hook, Walworth, Surrey—Imp. in folding envelopes and paper, and in machinery or apparatus employed therein.
 894. W. B. Lord, Plymouth, and F. H. Gilbert, Brixton, Surrey—An improved home ship for suddenly releasing horses and other cattle from their harness, also applicable for releasing heavy bodies or weights.
 896. R. Burley, Lower Thames street—An improved material for forming or lining the bearings of axles and shafts, and other rubbing parts of machinery.
 898. R. Nightingale, Maldon—Imp. in markers, butts, or mantelets.

900. J. Harding, Leeds—Imp. in the application of the waste heat arising from coke ovens for heating air for blast furnaces, also for calcining ironstones and other minerals, and for heating and smelting iron.
 902. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in rotatory engines. (A com.)
 904. W. M. Cranston, 58, King William-street—Imp. in machinery for cutting corn and other crops. (A com.)

Dated 1st April, 1862.

908. W. Clark, 53, Chancery-lane—Imp. in the manufacture of manure. (A com.)
 912. F. Knudsen, 33 and 34, Cockspur-street, Charing-cross—Imp. in chronometers.
 914. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for spinning cotton and other fibrous substances. (A com.)
 916. H. W. Whitehead and G. Bray, Leeds—Imp. in machinery for carding wool and other fibrous materials.
 918. J. Platt, and W. Richardson, Oldham—Imp. in mules for spinning and doubling.
 920. J. Platt, and W. Richardson, Oldham—Imp. in machinery or apparatus used for applying motive power derived from bullocks, horses, or other animals.

Dated 2nd April, 1862.

922. W. C. Harrison, 15, Sutherland-place, Pimlico, and H. J. Standly, 20, Cockspur-street, Westminster—An improved instrument or tool for boring or drilling holes in slate or other rock.
 924. Rev. G. Scrutton, Stickney, Lincoln—Imp. in shades or blinds for windows.
 926. R. A. Brooman, 166, Fleet-street—Imp. in memorandum, pocket, and other books, and in pencil and pen holders to be used therewith. (A com.)
 928. A. V. Newton, 66, Chancery-lane—Imp. in bits for taming or subduing vicious horses and breaking colts. (A com.)
 930. B. Blackburn, York-buildings, Adelphi—Imp. in apparatus for lubricating locomotive and other axles.
 932. T. Moore, 33, Regent-circus, Piccadilly—Imp. in winding apparatus especially applicable to fishing lines, nets, and log lines, and in leaders or travellers to be used therewith, which leaders or travellers are also applicable to working ships' sails, and other useful purposes.
 936. W. Clark, 53, Chancery-lane—Imp. in the manufacture of carbonic acid. (A com.)

Dated 3rd April, 1862.

940. G. Bower, Ashton-under-Lyne, and J. Qualter, Dukinfield, Cheshire—Certain imp. in metallic pistons.
 942. G. Hunter, Coleford, Gloucestershire—Imp. in machinery and tools for cutting, sawing, and planing stone, marble, and slate.
 944. W. Kemp, 20, Spital-square, and T. Cowley, Harts-lane, Bethnal-green—Imp. in the manufacture of silk pile velvet.
 946. D. Wilson, Wandsworth-common, and E. A. Cowper, 35a, Great George-street, Westminster—Imp. in presses for pressing cotton, fibrous materials, and hay.
 948. A. Mann, Tottenham—Imp. in photographic apparatus.
 950. H. T. Hassall, Birmingham, and M. Burke, Liverpool—Imp. in reclining or invalids' chairs, and in swinging or ships' chairs.

PATENTS SEALED.

[From Gazette, April 11th, 1862.]

<i>April 11th.</i>	<i>April 11th.</i>
2565. C. Wynants.	2637. R. Mushet.
2567. W. Ross.	2649. J. F. V. Dilliry.
2568. J. Gilbert.	2650. A. Morel.
2580. W. Smith.	2684. W. Robertson and J. M. Hetherington.
2586. C. De Groote.	2729. A. Topham, J. Topham, and J. Topham.
2591. W. Croome.	3101. M. A. F. Mennons.
2598. C. H. Holt.	23. H. Eschwege.
2599. W. Streather.	81. T. Ramsay.
2606. C. Cheyne & T. B. Moseley.	138. W. L. Winans.
2609. R. Mushet.	273. J. Hill.
2610. T. Lepeinteur.	
2633. J. Toward.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, April 15th, 1862.]

<i>April 7th.</i>	<i>April 12th.</i>
932. J. L. Stevens.	951. H. A. Silver.
<i>April 8th.</i>	997. L. P. Porter.
899. R. Wappenstein.	1100. D. Moore.
<i>April 9th.</i>	
890. J. Hawkins.	938. J. Beattie.
922. S. Tatton.	960. H. Harrison.
<i>April 10th.</i>	961. J. Sidebottom.
921. R. A. Brooman.	1050. J. H. Johnson.
	924. W. A. Martin & J. Purdie.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, April 15th, 1862.]

<i>April 5th.</i>	<i>April 10th.</i>
663. J. McKinnell.	805. J. L. Norton.
<i>April 9th.</i>	816. J. Templeton.
789. J. H. Johnson.	<i>April 12th.</i>
	823. G. Turner.

Journal of the Society of Arts.

FRIDAY, APRIL 25, 1862.

CONVERSAZIONI.

The Council have arranged for three conversazioni at the South Kensington Museum during the time of the International Exhibition; the dates fixed are Wednesday, the 7th May, the 9th July, and the 8th October.

Cards for the 7th of May have been issued to members of the Society, with the privilege of introducing a lady. Invitations will also be sent to Her Majesty's Commissioners, the Guarantors, the Foreign Commissioners, Jurors, the principal exhibitors, and others connected with the International Exhibition.

INTERNATIONAL EXHIBITION OF 1862.

SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £450,200, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The preparations and arrangements for the Opening Day of the Exhibition are now occupying so much attention that the description of the building promised to be continued in the last number is this week postponed in order to give some account of the proposed plan of the ceremony on the 1st of May. It is to be presumed that the readers of the *Journal*, as well as the public generally, are looking forward with some eagerness to the arrangements which will be made for the convenience and comfort of visitors on that day.

The Programme for the Opening Ceremonial shows that the Commissioners have spared no pains to render it as effective as possible. To

make it worthy of such an occasion, without the presence of the Queen, the difficulties have been many and great. The absence of a great central hall has been greatly felt in settling the local arrangements for the opening.

Spacious as are the domes and the nave, it was not found practicable to concentrate the whole of the ceremonial in one spot without stopping the arrangement of the exhibitors' objects. It became necessary, therefore, to spread the ceremony over the building, so that all the spectators should be equal participators in it as far as may be.

A throne, with a vacant Chair of State, will be erected by Mr. Crace in the centre and on the south side of the nave, and here the Opening of the Exhibition will be proclaimed.

The procession will start from the south centre court. It will be composed of representatives of all the Institutions of the country, as well as of Art, Science, and Industry, each person being in official dress or uniform, so that no complaint can be made of the sombre black coats commented upon at the opening of the Horticultural Gardens.

The procession will first proceed to the western dome, where it will stop for a few minutes, and where the address will be delivered by Earl Granville, to which the Duke of Cambridge will make answer. The western dome will be by far the best spot for witnessing the *spectacle* of the ceremonial. There is no doubt that the great choruses, with their 1,500 voices, will be effectively heard here. Those, however, who do not wish to run the risk of losing the music, and regard it as a principal attraction, should secure places for hearing in the eastern transepts. It may be apprehended that the effect of the music, immediately under the eastern dome, where Mr. Costa conducts his orchestra, will be somewhat loud and overpowering. Very wisely Mr. Costa will have no solo singing on this occasion. A velarium is to be stretched across the drum of the dome at the gallery.

The procession will remain at the eastern dome during the performance of the special music, which will consist of an occasional overture by Meyerbeer, a chorale by Sterndale Bennett, composed to the Poet Laureate's words, and a triumphant march by Auber.

At the conclusion of the music, the procession will proceed to the throne in the nave. The Bishop of London will offer up a prayer (the Archbishop of Canterbury being one of the Commissioners for the opening), and the Hallelujah Chorus will be sung, and lastly the National Anthem. The opening will be proclaimed by the Duke of Cambridge. The military bands will be conducted by Mr. Godfrey.

The following is the order of the ceremonial, so far as the arrangements have been settled:—

All persons provided with reserved seats will enter under the western dome. The holders of five-guinea season-tickets, and Fellows of the Royal Horticultural Society (if season-ticket holders) will be admitted by the north entrance of the Horticultural Gardens in the Kensington-road. Other season-ticket holders at the doors in the towers. All must enter between the hours of twelve and half-past one, and take their places (subject to Police regulations). The doors will be closed at half-past one.

Her Majesty's Ministers, the Commissioners for the Exhibition, the Foreign Acting Commissioners, and others taking part in the Procession, will assemble in the south central court before half-past one, and await the arrival of the Queen's Commissioners for opening the Exhibition.

On the arrival of the Queen's Commissioners, which will be announced by a flourish of trumpets, a procession will be formed in the following order:—

THE ORDER OF THE PROCESSION WITHIN THE BUILDING.

[All persons in the procession will be in Official, Academic, or Court Dress, or Uniform.]

1.
Trumpeters of the Life Guards in State Uniforms.
 2.
Superintendents of Building Works.
 3.
Contractors and Architect.
 4.
Superintendents of Exhibition Arrangements.
 5.
Poet Laureate.
 6.
The Lord Provost of Glasgow, the Lord Mayor of York, the Lord Provost of Edinburgh, and the Lord Mayor of Dublin.
 7.
Mace and Swordbearers of the City of London, preceding the Lord Mayor of London, and Sheriffs of London and Middlesex.
 8.
Council of the Horticultural Society, and Secretary.
 9.
Council of the Society of Arts, and Secretary.
 10.
Deputation of ten Guarantors of the Exhibition.
 11.
Members of the Building Committee, and Secretary.
 12.
Secretary of Finance Committee, and Financial Officer.
 13.
Special Commissioner for Juries, and Secretary.
 14.
Chairmen of Juries.
 15.
President of the Council of Chairmen of Juries.
 16.
Colonial Acting Commissioners, &c.
- | | |
|-------------------|------------|
| Australia, West. | Ceylon. |
| Australia, South. | Dominica. |
| Bahamas. | Grenada. |
| Barbadoes. | Hong Kong. |
| Bermuda. | Jamaica. |
| British Columbia. | Liberia. |
| British Guiana. | Malta. |
| Canada. | Mauritius. |
| Cape Colony. | Natal. |

New Brunswick.
Newfoundland.
New South Wales.
New Zealand.
Nova Scotia.
Prince Edward's Island,
Queensland.

St. Helena.
St. Vincent.
Tasmania.
Trinidad.
Vancouver's Island.
Victoria.

Ionian Islands.

17.

Foreign Acting Commissioners,

America, Central.	Netherlands.
America, South.	Portugal.
Austria.	Prussia.
Baden.	Rome.
Bavaria.	Russia.
Belgium.	Saxony.
Denmark.	Spain.
France.	Sweden and Norway.
Grand Duchy of Hesse.	Switzerland.
Greece.	Turkey.
Hanover.	United States.
Hanse Towns.	Wurtemberg.
Italy.	

18.

Presidents of Foreign Commissions.

19.

Her Majesty's Commissioners for 1851, and Secretary.

20.

Her Majesty's Commissioners for the Exhibition of 1862, and Secretary.

21.

The Bishop of London, accompanied by the Archdeacon of Middlesex and the Incumbent of the Parish.

22.

Her Majesty's Ministers.

(Not being either Commissioners for the Exhibition of 1862, or Special Commissioners for the opening):—

President of the Poor Law Board.
Chancellor of Duchy of Lancaster.
Postmaster-General.
President of the Board of Trade.
Chancellor of the Exchequer.
First Lord of the Admiralty.
Secretary of State for India.
Secretary of State for War.
Secretary of State for the Colonies.
Secretary of State for Foreign Affairs.
Secretary of State for the Home Department.
Lord Privy Seal.

23.

Her Majesty's Special Commissioners for the Opening.

24.

Royal Personages attending the opening.

25.

Gentlemen in attendance on Royal Personages.

26.

Detachments from the Marines, Grenadier Guards, Engineers, Artillery, Horse and Life Guards (dismounted), and Seamen.

The procession will proceed to the western dome, where there will be a chair of state, and, after the National Anthem has been sung, an address will be delivered by the Earl Granville, K.G., and an answer returned by his Royal Highness the Duke of Cambridge.

The procession will then move down the nave to the eastern dome, where the following musical performances will take place:—

The orchestra, consisting of 2,000 voices and 400 instrumentalists, will be presided over by Mr. Costa. The performances of music, specially composed for this occasion, will consist of an occasional overture by M. Meyerbeer; a

chorale by Mr. Sterndale Bennett (to words by the Poet Laureate), and a march by M. Auber.

At the conclusion of the special music, the procession will proceed to the throne in the centre of the nave. A prayer will be offered by the Bishop of London, and the Hallelujah Chorus, and the National Anthem will be sung. His Royal Highness the Duke of Cambridge will declare "The Exhibition Open."

The declaration having been made, it will be announced to the public by a flourish of trumpets, and by the firing of a salute on the north side of the Serpentine.

The procession will proceed to the Picture Galleries, and the barriers will be removed.

The Military Bands will be those of the Grenadier Guards, the Coldstream Guards, and the Scots Fusiliers, conducted by Mr. Godfrey.

The following are the words (by the Poet Laureate) to be sung to Professor Sterndale Bennett's music:—

Uplift a thousand voices full and sweet,
In this wide hall with earth's inventions stored,
And praise th' invisible universal Lord,
Who lets once more in peace the nations meet,
Where Science, Art, and Labour have outpour'd
Their myriad horns of plenty at our feet.

O, silent father of our Kings to be,
Mourn'd in this golden hour of jubilee,
For this, for all, we weep our thanks to thee!

The world-compelling plan was thine,
And, lo! the long laborious miles
Of Palace; lo! the giant aisles,
Rich in model and design;
Harvest-tool and husbandry,
Loom and wheel and engine,
Secrets of the sullen mine,
Steel and gold, and corn and wine.
Fabric rough, or Fairy fine,
Sunny tokens of the Line,
Polar marvels, and a feast
Of wonder, out of West and East,
And shapes and hues of Part divine!
All of beauty, all of use,
That one fair planet can produce,
Brought from under every star,
Blown from over every main,
And mixt, as life is mixt with pain,
The works of peace with works of war.

O ye, the wise who think, the wise who reign,
From growing commerce loose her latest chain,
And let the fair white-winged peacemaker fly
To happy havens under all the sky,
And mix the seasons and the golden hours,
Till each man find his own in all men's good,
And all men work in noble brotherhood,
Breaking their mailed fleets and armed towers,
And ruling by obeying nature's powers,
And gathering all the fruits of peace and crown'd with
all her flowers.

THE NATIONAL MEMORIAL TO THE PRINCE CONSORT.

The committee of noblemen and gentlemen recently nominated by the Queen to advise her Majesty in the choice and mode of execution of a design for a National Memorial to the Prince Consort have just presented a report upon the subject, a copy of which is subjoined, as is also the reply of her Majesty, through General Grey, addressed to Sir Charles Eastlake, the

President of the Royal Academy. It will be recollected that the committee was composed of the Earl of Derby, the Earl of Clarendon, Mr. Cubitt (the Lord Mayor), and Sir Charles Eastlake. The following is the report:—

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

We, the members of the committee appointed by your Majesty to consider the best means of giving effect to your Majesty's wishes in respect to a memorial to his Royal Highness the Prince Consort, humbly beg leave to report to your Majesty the result of our preliminary proceedings with reference to the matters committed to us.

From a letter dated the 19th of February last, addressed by Lieutenant-General the Hon. Charles Grey to the Right Hon. William Cubitt, the Lord Mayor, we learned that your Majesty had come to the conclusion that nothing would be more appropriate, provided it were on a scale of sufficient grandeur, than an obelisk, to be erected in Hyde-park, on the site of the Great Exhibition of 1851, or on some spot immediately contiguous to it; and that there would also be this advantage in a monument of this nature—that several of the first artists of the day might take part in its execution, for there would be room at the base of the obelisk for various groups of statuary, each of which might be entrusted to a different artist.

In accordance with the views thus expressed, we considered the condition of magnitude in the obelisk to be indispensable.

We could not but be apprehensive that considerable difficulties would have to be encountered in the ulterior arrangement of sculpture round the base, whether near or at some distance—bearing in mind the importance of giving the necessary prominence, in position and effect, to the statue of his Royal Highness the Prince Consort. We resolved, however, without entering on the consideration of this point, to confine our attention, exclusively at first, to the question of the possibility of finding in the United Kingdom a monolith of sufficient dimensions, combining with an approved colour the important condition of durability.

Our attention has, for these reasons, been restricted to granites. In our inquiries we have derived great assistance from the Director-General of the Geological Survey, Sir Roderick Murchison, through whom, with the aid of his correspondents at the quarries at present worked, we have received accurate information on the points to which our attention was chiefly directed. But we regret to say that in most instances the granite rocks so described to us, even when unobjectionable on account of the tint or reputed durability of the material, have not been found capable of furnishing a monolith of sufficient length. We have also to acknowledge liberal offers of materials in comparatively unexplored localities; but the cost of experimental excavations and the uncertainty of the result have deterred us from advising such undertakings.

The only case that has come under our notice in which the various requisites above enumerated may possibly be found to be combined, together with vicinity to the sea and comparative facility of transport, is that of a mass of granite of a light red tint in the Island of Mull, on land belonging to the Duke of Argyll, who with great liberality has placed all such materials on his estate at the disposal of the committee. Our investigations have been for some time confined to this locality; and we have to express our thanks to the Ross of Mull Granite Company, for the important assistance they have rendered us in enabling us to form an opinion respecting the fitness of the block in question. The length, which, in the excavated portion, already exceeds 115 feet, would, we consider, suffice for the intended obelisk. There appears, however, to be reason to apprehend that the width of the stone near the centre would be insufficient, according to the proportions of the most approved ancient examples, to be consistent with that height. It is also by no means certain that the

block referred to has the necessary thickness in those portions which are not yet cleared. An experienced contractor, who has examined it, has stated that nothing can be affirmed respecting the fitness of the stone "until it be raised and turned out from its present bed." For such operations a large outlay would be required, and we cannot but hesitate to recommend such outlay while we have no absolute certainty of a satisfactory result.

Although we have considered it on many accounts desirable that a monolith of the required dimensions should be obtained from some part of the United Kingdom, we have not omitted to make inquiries elsewhere. Knowing that large masses of granite of good colour can be procured in Russian Finland, as evinced by various remarkable specimens in St. Petersburg, we have consulted competent authorities respecting the fitness of that material. The replies we have received cannot be regarded as satisfactory, since it appears that the granites in question, however well adapted for interior decoration, have not the reputation of being durable in the open air.

With regard to the important point of expenditure (assuming a monolith to be found in our own country), we consider that, from the variety of estimates we have privately received, the novelty of the undertaking probably rendering any approach to accuracy difficult, we are by no means in a position to name a sum that would represent the ultimate cost, more especially as it is the opinion of many that the obelisk would present an incomplete appearance unless the surface were enriched with incised sculpture, on the principle of execution (however different from the representations) adopted on Egyptian obelisks. Without, however, venturing to assign a limit to the entire cost, we conceive we are justified in expressing our opinion that the whole of the sum already subscribed would be absorbed by the obelisk alone.

While, therefore, we see no reason to conclude that success is absolutely unattainable, we believe that it would be accompanied by difficulties and by expenditure at present wholly incalculable; nor can we refrain from expressing our serious doubts whether, even if the mere enterprise were successful, the ultimate effect would be such as to realise your Majesty's just and natural expectations.

Having laid fully before your Majesty the information which we have received, and the inferences we have drawn, we humbly await the signification of your Majesty's pleasure as to prosecuting our present inquiries or

directing them to some other mode of meeting the great object in view.

DERBY.
CLARENDON.
WILLIAM CUBITT.
C. L. EASTLAKE.

Westminster, April 14.

To this report General Grey has sent the following reply :

Osborne, April 19.

My dear Sir Charles,—The Queen commands me to acknowledge the receipt of the report from the committee named by her Majesty to advise her on the subject of the proposed national memorial to the Prince Consort.

Her Majesty cannot refuse her assent to the reasons so clearly and strongly put forward in the report which induce the committee to doubt the expediency of any further attempts to find a monolith that would fulfil the conditions on which her Majesty's choice of an obelisk as the distinguished characteristic of the proposed monument mainly depended.

Her Majesty sees, therefore, no alternative but to acquiesce in the abandonment of the idea of an obelisk, and to request the committee to turn their attention to the possibility of finding some other mode in which the great object in view may be most satisfactorily effected.

Her Majesty's wish is to leave the committee quite free to recommend whatever may appear to them to afford the best hope of a satisfactory result; and she would merely throw out as a suggestion whether the opinions of some of the foremost architects of the day might not be advantageously taken as to the means of combining the groups of statuary mentioned in my letter to the Lord Mayor (amongst which of course a statue of the Prince would be prominent) with some other design.—I remain, yours very faithfully,

Sir C. Eastlake.

C. GREY.

The following is a list of the General Committee, formed in accordance with the resolutions passed at the meeting held at the Society's House, on the 10th inst. It has been arranged with a view to include representatives of all classes and interests in the country :—

GENERAL COMMITTEE.

H.R.H. THE DUKE OF CAMBRIDGE, K.G.

The Archbishop of Canterbury.
The Lord High Chancellor.
The Archbishop of York.
The Duke of St. Albans.
The Duchess of St. Albans.
The Duke of Buccleugh, K.G.
The Duke of Devonshire, K.G.
The Duke of Manchester.
The Duchess of Manchester.
The Duchess of Norfolk.
The Duchess Dowager of Norfolk.
The Duchess Dowager of Sutherland.
The Duchess of Wellington.
The Marquis of Abercorn, K.G.
Frances Anne, Marchioness of Londonderry.
The Marquis of Salisbury, K.G.
The Marchioness of Salisbury.
The Marquis of Westminster, K.G.
The Marchioness of Westminster.
The Earl of Dalkeith.
The Countess of Dalkeith.
The Earl of Clarendon, K.G.
The Countess of Clarendon.

The Earl Cowper.
The Countess Cowper.
The Countess of Derby.
The Earl Grey.
The Countess Grey.
The Earl of Hardwicke.
The Countess of Hardwicke.
The Countess Dowager of Jersey.
The Earl of Malmesbury.
The Countess of Malmesbury.
The Earl Nelson.
The Countess Nelson.
The Countess Russell.
The Earl of Sefton.
The Earl of Shaftesbury.
The Countess of Shaftesbury.
The Earl Somers.
The Countess Somers.
The Earl of Shelburne.
Lady M. L. Douglas-Pennant.
The Hon. Col. Douglas-Pennant, M.P.
Lady Adeliza Manners.
Lord E. G. F. Howard, M.P.
Lady E. G. F. Howard.

Lord Henry George Lennox, M.P.
The Viscount Palmerston, K.G.
The Viscountess Palmerston.
Lord Elcho, M.P.
Lady Elcho.
Lady Mildred Hope.
A. J. B. Hope, Esq.
The Bishop of London.
The Bishop of Durham.
The Bishop of Bangor.
The Bishop of Chester.
The Bishop of Chichester.
The Bishop of Ripon.
The Bishop of Norwich.
The Bishop of Oxford.
The Bishop of Ripon.
The Bishop of Rochester.
The Bishop of St. David's.
The Bishop of Worcester.
The Right Rev. Dr. Grant.
Lady Foley.
Lord Ashburton.
Lady Ashburton.
The Dowager Lady Lyttelton.

Lord Lyttelton, Lord Lieutenant of
Worcestershire.
The Rt. Hon. W. E. Gladstone, M.P.
Mrs. Gladstone.
The Right Hon. W. Cowper, M.P.
Mrs. Cowper.
The Right Hon. the Lord Mayor.
The Count P. de Strzelecki, C.B., D.C.L.
Lady Mary Hoare.
Henry Hoare, Esq.
The Hon. Mrs. Rous.
The Hon. and Very Rev. The Dean of
Windsor.
The Hon. Mrs. Wellesley.
The Hon. and Rev. Canon Grey.
The Hon. Col. Talbot.
Lady Knight Bruce.
Vice-Chancellor Sir W. P. Wood.
Lady Wood.
The Hon. Fred. Byng.
The Hon. and Rev. Samuel Best.
The Hon. A. Kinnaird, M.P.
The Hon. Mrs. A. Kinnaird.
Lady Molesworth.
Sir John P. Boileau, Bart.
Sir J. V. Shelley, Bart., M.P.
Sir C. Wentworth Dilke, Bart.
Miss Burdett Coutts.
Sir Thos. Phillips, Vice-Pres. and Chair-
man of Council of Society of Arts.
Sir R. J. Murchison, F.R.S.
Sir Charles Fox.
Mrs. Tollemache.
The Dean of Canterbury.
The Rev. G. R. Gleig, Chaplain-
General of the Forces.
The Rev. Canon Champneys.
The Rev. Canon Fearon, Loughboro'.
The Rev. Canon Lonsdale, Sec. Nat. Soc.
The Rev. Canon Miller, Birmingham.
The Rev. J. F. Lingham, Lambeth.
The Rev. J. Rattenbury, President of
the Wesleyan Conference.
The Rev. Geo. Smith, Secretary to the
Congregational Union.

The Rev. S. Martin, Westminster.
The Rev. I. C. Harrison.
The Rev. J. Howard Hinton.
The Rev. J. Stoughton.
Thomas Dyke Acland, Esq., Exeter.
James Allport, Esq., Derby.
Charles J. Andrewes, Esq., Reading.
F. D. P. Astley, Esq., Dukinfield.
John Alger, Esq.
Thomas Bazley, Esq., M.P.
John Bell, Esq.
Richard Birkin, Esq., Nottingham.
W. H. Bodkin, Esq.
Antonio Brady, Esq.
T. Brassey, Esq.
Henry Bury, Esq., Manchester.
John Cassell, Esq.
Harry Chester, Esq.
John M. Clabon, Esq.
A. B. Cochrane, Esq., Stourbridge.
T. Clegg, Esq., Manchester.
G. Clowes, Esq., Stamford-street.
Henry Cole, Esq., C.B.
Frank Crossley, Esq., M.P.
Chas. Crookes, Esq., Coalbrook-dale.
G. Dawbarn, Esq., Wisbech.
R. Dawbarn, Esq., Wisbech.
George Dawson, Esq., M.A.
John Dillon, Esq.
G. Dines, Esq.
Wm. Fairbairn, Esq., LL.D., F.R.S.
P. Le Neve Foster, Esq.
J. Griffith Frith, Esq.
M. A. Garvey, Esq.
G. Godwin, Esq., F.R.S.
Peter Graham, Esq.
Egerton Vernon Harcourt, Esq.
Edward Hamilton, Esq.
James Hartley, Esq., Sunderland.
William Hawes, Esq.
John Hawkshaw, Esq., Pres. Inst. C.E.
M. J. Higgins, Esq.
Mrs. Higgins.
Henry Thomas Hope, Esq.
Messrs. J. and F. Howard, Bedford.

David Howard, Esq., Machynlleth.
Mrs. Howell.
Robert Hunt, Esq., F.R.S.
John Kelk, Esq.
Mrs. Kelk.
N. Kendall, Esq., M.P.
J. B. Lawes, Esq., St. Alban's.
Francis Le Breton, Esq.
F. Levick, Esq., Newport.
T. Longman, Esq.
Messrs. Lucas Brothers.
J. C. Macdonald, Esq.
William Thomas Mackrell, Esq.
Edward Marjoribanks, Esq.
Matthew Henry Marsh, Esq., M.P.
T. J. Miller, Esq., M.P.
G. Moffat, Esq., M.P.
Samuel Morley, Esq.
Lieut.-Col. R. C. Owen, R.E.
Edward Peyton, Esq., Birmingham.
Mrs. J. G. Phillimore.
Thos. Page, Esq.
John Platt, Esq., Oldham.
Wyndham S. Portal, Esq.
H. Pownall, Esq., Chairman of Mid-
dlesex Sessions.
F. Ransome, Esq.
Samuel Redgrave, Esq.
Lestock Robert Reid, Esq.
Arthur Ryland, Esq., Birmingham.
Sir J. V. Shelley, Bart., M.P.
W. B. Simpson, Esq.
Thomas Sopwith, Esq., F.R.S.
R. J. Spiers, Esq., F.S.A., Oxford.
Wm. Spottiswoode, Esq., F.R.S.
W. M. Thackeray, Esq.
Miss Thackeray.
William Tooke, Esq., F.R.S.
H. Hussey Vivian, Esq., M.P.
W. Graham Vivian, Esq.
George F. Wilson, Esq., F.R.S.
Thomas Winkworth, Esq.
Edward Wigram, Esq.
J. Carter Wood, Esq., Victoria-street,
Westminster.

The Executive Committee consists of the fol-
lowing :—

The Duke of St. Alban's.	H. Cole, Esq., C.B.
The Marquis of Salisbury,	H. Chester, Esq.
K.G.	M. H. Marsh, Esq., M.P.
The Earl of Derby, K.G.	E. Marjoribanks, Esq., <i>Hon.</i>
The Earl of Malmesbury,	<i>Treasurer.</i>
G.C.B.	J. M. Clabon, Esq. } <i>Hon.</i>
The Hon. Colonel Talbot.	P. Le N. Foster, Esq. } <i>Secs.</i>
The Hon. F. Byng.	S. Redgrave, Esq.
Sir Thomas Phillips.	

The present Committee has been formed, as
stated in the report of the meeting above referred
to, in accordance with a general feeling which has
for some time prevailed, that in order to give a
national character to the Memorial, means should
be taken to interest in the movement the in-
dustrial classes, so that the fund may include the
shillings or the pounds of the farmer and trades-
man, as well as the pence of the artisan and
labourer.

The Committee are seeking the aid of the
clergy, of ministers of all denominations, of all
employers of labour, of vestrymen, church-

wardens, deacons, visitors, school teachers, and
other influential persons, and with this view they
have issued the following suggestions for the as-
sistance of persons acting in concert with the
General Committee :—

1. To make known the objects of the Committee, it
will be advisable, as a first step, to assemble a few persons
well known to every class in the district, in the school-
room, vestry hall, or other convenient place, to explain
to them the intention to erect a Memorial to the Prince
Consort, and to engage their co-operation.

2. To those present at this meeting who are willing to
receive subscriptions, districts should be assigned, and all
should be enjoined to seek the assistance of their friends
and neighbours.

3. In the large parishes and districts it will be found
advisable to appoint a Sub-Committee, with a secretary
and treasurer.

4. The contributions will range from one penny upwards,
and the plans of those who undertake to receive them
should be so organised that every person may be enabled
to make his contribution with the least trouble. This
may be managed by subscription lists or money boxes,
placed in the parish and other schools, the post office,
the chief shops and other places of the most common
resort.

5. At an adjourned day, to be fixed at the original meeting, the persons who took charge of the collection should give in their lists and the sums collected, and if necessary a further adjournment should be fixed.

The remittances to the General Committee should be by crossed cheque on a London bank, crossed "Countts and Co.," or by a Post-office Order on the Charing-cross Post-office, made payable and addressed to Samuel Thomas Davenport, Assistant Treasurer, Society of Arts, Adelphi, London, W.C.

EIGHTEENTH ORDINARY MEETING.

WEDNESDAY, APRIL 23RD, 1862.

The Eighteenth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 23rd inst., Henry Cole, Esq., C.B., Vice-President of the Society, in the chair.

The following candidates were proposed for election as members of the Society:—

Aukstell, Wm. Robert ...	West-hill, Harrow, N.W.
Billinge, James	Ashton, Lancashire.
Dalrymple, James	{ Langlee-house, Galashiels, N.B.
Du Pré, Caledon George, M.P.	{ 40, Portland-place, W.
Gurney, James	{ 67, Addison-road, Kensington, W.
Heinke, W.	{ 79, Great Portland-street, Portland-place, W.
Irving, John	{ 94, Eaton-place, S.W.
Moore, John	{ 104, Bishopsgate-st.-within, E.C.
Newhouse, Titus	{ 10, Douglas-road, Canonbury, N.
Painter, Thomas	Wrexham.
Petherick, Horace William	{ 2, Rosa-villas, Lillie-road, St. John's, Fulham, S.W.
Plumptre, Chas. John ...	{ 1, Essex-court, Temple, E.C., and 26, Elgin-road, Kensington-park-gardens, W.
Preller, E.	Bradford, Yorks.
Steele, Andrew	33, Great George-st., S.W.
Tarring, John	26, Bucklersbury, E.C.
Walsh, Edward	{ 10, Darnley-road, Royal-cres- cent, Notting-hill, W.
Ward, Henry	{ 100, Great Russell-street, Bloomsbury.

The following candidates were balloted for and duly elected members of the Society:—

Bremner, Samuel	{ "Belle Sauvage" Printing Works, Ludgate-hill, E.C.
Cave, Stephen, M.P.	35, Wilton-place, S.W.
Cocksedge, Henry Bary ..	20, Bucklersbury, E.C.
Coxon, Benjamin Payne ..	Warrington.
Crispe, James	4, Cheapside, E.C.
Donaldson, J. Hunter ...	176, Oxford-street, W.
Harris, Samuel J.	176, Oxford-street, W.
Head, Samuel Heath	{ 5, Martin's-lane, Cannon-st., E.C., and Spring-grove- cottage, Isleworth, N.
Potter, Thomas	44, South Molton-street, W.
Shrimpton, John	New Wanstead, N.E.
Spence, Peter	Manchester.

The paper read was—

ON THE EFFECT OF PRIZES ON MANUFACTURES.

By SAMUEL SIDNEY.

In a week from the present evening, the Great International Exhibition of 1862 will be opened, under two essentially different conditions from those which regulated the Exhibition of 1851. Prizes will only be given for absolute merit, and not for gradations of merit, as on the former occasion. Sales (by sample) will be authorized. The question to be examined and discussed this evening is, whether this decision is founded on sound commercial and economical principles. Whether under any and what circumstances the improvement of manufactures can be promoted, or manufacturing inventions stimulated, by invitations to compete for substantial or honorary rewards?

Neither prize poems, nor prize bulls, nor Derby winners, nor the latest example of prize competitions, the candidates for civil and military service, are within the scope of this paper, which will be strictly confined to considering the influence of competitive prizes on staple articles of trade and manufactures—articles produced in quantity or numbers, to be sold at a profit—articles whose value consists in utility, or beauty of design, durability or cheapness, or a combination of some or all these qualities.

It is a question that ought not, and need not, be discussed on theoretical grounds; we have the experience of centuries of trade to refer to; and within a convenient compass, the records of more than one Society, including that under whose auspices this discussion will take place.

The views contained in this paper have not been suddenly adopted. Ten years have elapsed since the attention of the author was first drawn to the prize system as applied to manufactures, and as he has carefully studied its effects ever since, in the course of pursuits which particularly occupy his attention, he hopes to lay his conclusions before you in the spirit of candour and impartiality, befitting the character of papers read before this Society.

There can be little doubt that if the question were asked of any half-dozen members of the wealthy and educated classes who had not been concerned in competitive exhibitions, the majority would unhesitatingly answer, "Undoubtedly prizes have been of the greatest possible benefit to manufactures."

The prize system is the very salt of our public schools and universities—on a system of prizes, the racing ring, the most universal democratic amusement and business of this country, revolves; almost every landed squire takes part in distributing rewards amongst the breeders and feeders of prize cattle, and not unfrequently, amongst prize labourers. But if we were to ask anyone, not being of the manufacturing class, why he believed that the system which produces great scholars, and wonderful short-horns, and swift race-horses, has produced, and will produce material improvements in manufactures, he would be surprised to find how few and far between are the facts in support of this pet and attractive theory—mere drops in the ocean of our manufacturing system.

A vague impression no doubt prevails that prizes have produced extraordinary improvement in certain trades, but when we proceed from generalities to particulars, and seek for direct evidence in support of this opinion, either amongst the successful competitors for the prizes distributed amongst manufacturers of all nations, as on the occasion of Great International Exhibitions, like those of London in 1851, and Paris in 1855 and 1856, or at the annual distributions of those British Societies which include prizes amongst other means of encouraging commercial and manufacturing enterprise, we are strangely disappointed. We turn over page after page, year after year, of awards, without finding an instance of remarkable inventions brought to light, or of obscure merit discovered and rewarded.

It will be found on close inquiry that the faith which many intelligent persons have in the advantage of the universal application of the prize system generally rests on what may be called the "Post hoc, propter hoc," or, to paraphrase freely, the "Why and Because" fallacy.

As thus:—Prizes have been awarded in a particular trade—there has been a great improvement in that trade—therefore it is the result of the medals, or the ten pound notes, offered and distributed by this and that government, society, or commission. In this order of reasoning it is altogether forgotten that in every manufacture for which there is a daily increasing demand there is also daily competition between the manufacturers and vendors, and a prize offered by every one who deals in it, in the shape of profits.

Wherever there has been an improvement there has also been a demand. The improvement is invariably the result of the competition of manufacturers desirous of supplying the demand.

Nay, more, it can be shown that rewards of a very munificent character have failed to develop mechanical inventions, which at a later date, when a national demand required them, were made and adopted without the stimulus or honour of medal or prize money.

Let us consider what are the objects for which prizes are supposed to be distributed amongst manufacturers who are invited to compete in public exhibitions and the trials arising out of those exhibitions. The presumed objects of such prizes are either to procure the invention or improvement of something which the ordinary demands of trade are not sufficient to produce, or to assist customers by the intervention of judges more competent than the customers to decide on the comparative merit of rival manufacture.

There is a third object not so generally known or avowed—to amuse and interest an uninstructed public by the excitement incident to the competition of a race. And when the public is really interested, a great, although indirect, benefit may be conferred, for often—to paraphrase Goldsmith—

"Those who come to stare remain to buy."

The first object or pretext—"the improvement or invention of something not produced by the ordinary demands of trade"—may be dismissed very summarily. It is something like Charles the Second's question to the Royal Society, "Why two or three small fish added to one of two buckets of water of equal weight have no effect on the balance?" The most important manufactures of this country have been carried to their present perfection by the ordinary demands of trade competition. No prizes or honorary rewards of an official or unofficial character have ever been bestowed on, or offered to, the authors of the steps by which the iron manufacture, or the manifold hardware trades of Birmingham and Sheffield, or the woollen manufacture, including that of alpaca wool, which has created a new material, a new town, and provided for a district—or the cotton manufacture, or the linen manufacture of Ireland and Scotland, have become famous throughout the world. The manufacture of marine steam engines, in which such wonders have been effected during the last ten years—the locomotive engine, in which three hundred horse power is packed up with the accuracy of a watch—have both found sufficient stimulus for daily improvement in commercial enterprise and commercial demand. It is true that on the first passenger railway, the Liverpool and Manchester, there was a locomotive race for five hundred guineas, won by George Stephenson's engine, which has been in its most essential principles the type of every engine since made, but the experiment of racing locomotives has never been thought worth repeating.

It is possible that in a country where manufactures were of artificial growth, where success of every kind is expected to be rewarded by the State, where a strictly protective system has accustomed manufacturers to look for official assistance and official reward, a medal or a ribbon may have a more powerful effect than on our matter-of-fact

manufacturers, who concentrate their hopes and exertions in obtaining a reputation and customers. But it is quite certain that in any country where the spirit of commercial enterprise is widely diffused, the profits of useful inventions and successful manufactures far exceed in value any prizes that can be offered by a non-commercial society, or even a government.

Instances of the soundness of this conclusion are easily found. The Royal Agricultural Society, better placed for obtaining competent judges and practical trials than most societies of the kind, has, for 22 years, distributed prizes amongst a select band of implement makers. During that period, inventions and improvements, of extraordinary value to farmers, have been made under the influence of exhibitions and competition, without reward, while toys and contrivances of a worthless character have been raised by prizes into injurious notoriety. But the Society can only lay claim to developing one important invention by a prize—the conversion of a perpendicular into a horizontal drain-tile making machine.

One of the most prominent and energetic members of the Society of Arts often says, that the only inventive result of the long list of prizes given by the Society during more than 100 years, which he has been able to discover, is "The Shilling Colour Box!"

Centuries of experience prove that mechanical invention of a high order is a vocation not to be raised by a forcing process, like early peas or strawberries. Prizes have never produced a great poem, a great prose essay, a great picture, a great musical composition; but they have stimulated the growth of a mushroom brood of useless novelties, the result of the misdirected efforts of common-place people. Admirably is this prize-giving mistake sketched by Balzac, one of the greatest French novelists, in the first chapter of his painfully exact picture of *Le Cousin Pons*:—"The old musician was one specimen of the many victims of the fatal and degrading system called 'competition' (*concours*), which still reigns in France, after a hundred years barren of results. This hot-bed for breeding genius was invented, in 1746, by the brother of Madame de Pompadour, who was then President of the Academy of Fine Arts. Try to count on your fingers the men of genius—sculptors, painters, musicians—who have been prize-winners during all these years. The artists raised under this hot-house process are forgotten as soon as crowned, and the public of taste turns to the great men who, indifferent to prizes, have arisen and flourished in the free air, under the influence of that invisible sun—vocation!"

But perhaps the advocates for distributing prizes amongst the manufacturers of the staple objects of trade—and these advocates are generally found amongst amateurs with more zeal than exact knowledge—will argue that prizes promote solid improvements, if they fail in producing great inventions. Let us examine this theory, on which the distribution of the Council Medals of the Great Exhibition of 1851 was founded.

The offer of prizes for standard articles of trade, such, for example, as cloth, clocks, musical instruments, steam engines, cutlery, and agricultural machines, assumes:—

1st. That customers are not competent to select what they require.

2nd. That there are tests or trials by which the marketable value of the articles in competition can be ascertained.

3d. That judges can be found competent to direct and appreciate the comparative tests, and sufficiently free from local or natural prejudices to be impartial.

4th. That there is some security that the articles rewarded are average specimens of the goods the successful manufacturer has sold or intends to sell.

On one or all of these points it will be found, on examining the records of prize-giving exhibitions, that the prize system has invariably broken down.

Who is there who would be willing to leave to a third person, however clever, the choice of his clothes, or his furniture, the house he was to live in, and least of all the

implements or machines he was to use in his trade. Under such a dispensation there would be a great many people hobbling about in prize boots and shoes; and dress coats, like Sir Edwin Landseer's, in which a man could not dine, would be a common grievance.

The difficulty of finding competent judges is familiar to everyone who has had anything to do with prize-awarding societies. To find one man who combines, with accurate technical knowledge, the industry, the close observation, and the power of reasoning requisite in the judge of closely competing claims, is sufficiently difficult, but then he must also be impartial—he ought to have no leaning toward the person or the locality where he acquired his knowledge—he is not to feel as an Englishman or a Scotchman, as a Suffolk-man, or as a Kent-man—he is simply to be a judge, without any laws, precedents, or customs to guide him; and, having found this Phoenix, you have to find a dozen like him. If any one thinks competent judges of manufactures are to be found, even on the greatest occasions, let him turn to the array which decided on the prizes of the International Exhibition of 1851.

The difficulty is increased immeasurably where the judges differ not only in their ideas and standards of perfection, but in their nationality, and have to converse and discuss in a foreign language.

But suppose these rarest of all living animals, competent and impartial judges of manufactures, found, how few are the instances in which it is possible to test, in a satisfactory practical manner, the comparative merits of manufactured articles, even if they appear to be of the same kind, material, and quality. First, a standard of comparison must be established, and then the needful tests must be applied. What standard of comparison, or what tests can be applied to textile goods, cottons, silks, woollens, carpets? Beauty of design is a matter of national taste; the wearing qualities can rarely be ascertained by the touch; whether the price is cheap or dear, can only be decided by a knowledge of the quality of the article and the wants of the customer; this man desires a coat to wear for years, that man, something at a low price for a short season, or until he can spare more money—both must be served, and are served by the trade, and only the dealer and the customer can usefully settle such points.

Plated wares, hardware, cutlery, and furniture, present difficulties as great as textiles. Are razors to be tried by a course of shaving? What is to settle the merits of rival broughams and competing arm-chairs? What trials can be carried out for placing in due order printing presses, pianos, or marine steam engines? The list of difficulties is at least as long as the classes of an International Exhibition, and the moment the undertaking is gravely considered, it becomes evident that an award of prizes can only be made by hap-hazard, or by a system of compromises, or by following a groove of precedents, and invariably bestowing the first prizes on established trade reputations. The last will be found to be the expedient which resolved the difficulties of jurors, puzzled by competing claims and overwhelmed by work, in London and Paris.

But, supposing the prize-awarding labour ended, another difficulty presents itself, which involves the utility of the whole proceeding. What security is there that the prize-winning article has not been got up, regardless of expense, to win the prize—as an advertisement in fact? The very effect of a prize for a manufactured article is to remove the responsibility of personal reputation from the prize winner and throw it on the judges.

That such is the result is notorious. Machines and goods are prepared, like Peter Pindar razors, expressly to win. We have racing steam-engines, which, when successful, are sent home to be reduced to working order before being delivered to a purchasing customer; cases of cutlery, which no shopkeeper could afford to buy if he meant to make a profit by selling them again; and a long list of machines which, for practical purposes, are no better than toys, fitted to work for a few hours under the ma-

nagement of a skilled mechanic. In addition, in every exhibition of machinery there are a number of colourable alterations and improvements, devised to satisfy the passion for "something new," which is the peculiar failing of amateur judges.

Of course it cannot be denied that prizes are very useful advertisements to those who win them, and for this reason, that wherever there is any competition which involves expense they fall to wealthy firms. The theory that prizes encourage humble merit is only a theory, for experience shows that in a series of yearly contests wealth wins, as it must when hundreds of pounds must be expended to win ten. The truth is that admirers of the prize system confound the advantage of public exhibitions and the public competition of trade with prize competition. The most complete system of annual competition for prizes in this country is that organised by the Royal Agricultural Society, and there it is sustained by unrestricted sales—in fact, by a great agricultural fair, which commences when the races for implement prizes have concluded. The Fair is crowded, the business done is an index of the prosperity of British Agriculture, while for years the trials of implements have been, save in such important novelties as steam cultivation, performed in deserted fields, without other than official witnesses.

But before examining the results of the well-meant labours of the judges of the Royal Agricultural Society, it may be as well to take a glance at the prizes of the Exhibition of 1851; a list which exhibits prominent examples of all the illogical incongruities which it has been the object of this paper to make plain. The prizes of 1851 were of two classes—the Council Medal being intended to designate superior and original excellence. 170 Council Medals were distributed, but I have only been able to discover two instances in which extraordinary novelty or utility were thus rewarded, that is to say, Sir Joseph Paxton for the design of the building, which certainly required no medal to stamp its fitness for its great purpose, and Mr. McCormick for his American reaper, the latter being, in my humble opinion, one of the most useful results of the Exhibition.

After Paxton and McCormick, I find a list of names favoured with the Council medal, whose reputation was not enhanced by the success, or whose success in competition with other names of equal reputation was, in many instances, only due to some fortunate accident in the composition of juries. For instance, it cannot be argued that the public gained any information, or that the firms themselves derived any honour from Council Medals bestowed on the great Belgian firm of Cockerill, or on Messrs. Penn, of Greenwich, or Messrs. Maudslay and Field, or Messrs. Fairbairn, or Mr. Nasmyth for his steam hammer, or Mr. Joseph Whitworth, and on other names equally distinguished in their respective manufactures. It certainly does not seem worth while to organize an intricate Court of Arts and Science to tell the world that Mr. Whitworth is a clever mechanic, and the steam hammer a capital invention. It is rather puzzling not to find the name of Broadwood placed in the place of high honour in the musical class, and not at all surprising that in the class for horological instruments, the late Mr. Dent's name occupies a first place. Agriculturists laugh when they see Busby with a Council medal, and such firms as Ransome and May, Clayton and Shuttleworth, and Howard on the lower list. In a word, the more closely we examine the awards of Council medals, the more are we at a loss to discover the principle on which they were awarded, or the public object which was promoted by such prizes being offered. This list of Council medals is of itself a complete and conclusive defence for the resolution not to award competitive medals, adopted by the Commissioners of 1862. A judgment should be founded on evidence. There is very rarely available reliable evidence to guide judges in deciding on the relative merits of manufactures and machinery, therefore such trials and such verdicts had better be avoided. They unfairly raise, and unfairly

depress manufacturers, while they only mystify the public.

But the transactions of the Royal Agricultural Society, regularly recorded, and extending over a period of twenty-two years, supply the most complete contradiction of the assumed useful effect of prizes for manufactures,—a theory which is much in favour with a large and increasing class in modern society, composed of gentlemen of wealth and position, with a slight knowledge of divers practical pursuits, some enthusiasm, a great love of patronage, and nothing to do.

The Royal Agricultural Society is more competent than most societies or commissions to test the competitive value of the machinery and implements in which its members are interested—for it has a wide choice of judges amongst persons who have, at least, some qualification for the office as agriculturists and mechanics; its operations are conducted in public; its Council is composed of men connected more or less directly with agriculture, and sincerely anxious to promote agricultural improvement—yet there are to be found, in the management of its prizes, illustrations of all the errors inherent in a system which proposes to reward the merit of mechanical inventions which cannot be created and which cannot be tested. Thus the Royal Agricultural Society has failed to reward improvements of the highest importance in agriculture. It has bestowed prizes on perfectly useless inventions. It has distributed a prize for each of several implements constructed on different principles, in such a contradictory manner, that after ten years of trials it is impossible to learn anything useful from the awards of the judges. It has year after year awarded prizes to some firm or person, or two or three persons in turn, long after the machines or implements rewarded had become standard, universally used, and capable of only colourable improvement.

The sincere desire of the Council to be useful has been baffled by the impossibility of testing in experiments, at the wrong season, in a few hours or days, the actual merits of agricultural implements. At least half the trials are in defiance of the vulgar proverb, "Teaching your grandmother, &c."

The Society has distributed in 22 years £6,060 in money, two gold medals, five Council medals (at the time of the Great Exhibition), and 256 silver medals, for every kind of miscellaneous article, from a field-gate to a sausage-machine. Amongst its omissions, for eleven years, no prize was offered for a reaping-machine. Mr. McCormick's arrived by accident at the Great Exhibition of 1851, and received a Council medal. It was then discovered that the Rev. Mr. Bell had, many years previously, received a gold medal from the Highland Society for a reaping-machine, which, not being needed by the public, had been forgotten. Since that date three varieties of reaping machines have been brought into competition. "First (I quote from a letter to the *Mark-lane Express*), those on the 'Hussey' principle, which only cut the corn, and require a man to deliver it in bundles left behind the machine; second, 'McCormick's' reapers, which carry a reel or fan to gather the crop, and, since 1854, have had the addition of a self-delivering apparatus to lay the cut corn in swathe; third, 'Bell's' machine, differing from the others in going in front of the horses, and which can therefore enter any part of the standing crop, and is capable of delivering the cut corn in swathe on either side. The awards of the Royal Society have been made to these three classes of machines in the rotation shown by the following table: so impartial has been the division, that the advocates of neither sort can boast of the slightest advantage over the other, and the successive decisions are so uniform that anyone knowing nothing of either the machines or crop for the next trial may, with perfect safety, bet two to one against the prize being taken by Bell again, and it is about even betting on the other two, the call being slightly in favour of Hussey, as it was behind McCormick in the last rotation.

Year.	Place of Trial.	First-Prize Reaper.
1851	.. At the Great Exhibition ..	McCormick.
1852	.. At Lewes	Hussey.
1853	.. At Gloucester and Pusey ..	Bell.
1854	.. At Lincoln	Hussey.
1855	.. At Carlisle and Bristol ..	McCormick.
1856	.. At Chelmsford and Boxted...	Bell.
1857	.. At Salisbury... .. .	McCormick.
1860	.. At Canterbury	Hussey.
1861	.. At Leeds and Garforth ..	Bell.

"The result to the agricultural public is, that every farmer requiring a machine must form his own opinion as to what reaper is most suitable to his land and crops; it is entirely hopeless for him to expect to derive any reliable assistance from decisions, to obtain which all the care and trouble of our most wealthy and influential agricultural society, have been devoted."

Mowing machines, also of American invention, followed corn cutting machines to this country, and the awards of prizes have been equally contradictory and puzzling. In 1857, at Salisbury, a first prize was given (very properly according to the prize system) to a machine which did its work admirably on about an acre of ground, under the management of a very clever man, and that was all it could do. It has never come into use. It was a toy got up to win a prize and find a purchaser.

Steam cultivation is another of the great facts of the agricultural age, for which prizes have done as little as possible. The Highland Society offered a prize every year from 1836 to 1843 for the first successful application of steam power to the cultivation of the soil, without result, but when the time came, and the public wanted steam in the fields, Smith, of Woolston, with his steam cultivator, manufactured by Howard, made the system popular in many counties, without receiving a prize at all, and Fowler had spent twenty thousand pounds before the tardily offered prize of the Society was awarded to him.

Turning from arable cultivation to the dairy, Keevil's machine which almost entirely supersedes women's labour in cheesemaking, and enables one man to make nine tons, has been invented and widely introduced in Wiltshire and Gloucestershire, without receiving any prize at all from the Society. A churn of no value, except in a farm-dairy of two cows, has been thrice rewarded.

Again, prizes varying from £3 to £10 have been awarded to the extent of £35, for a gorse bruiser, a machine which had its origin in a crotchet and never found a farmer-purchaser. Five prizes, of £10 each, have been given for drop drills, a perfectly useless implement, made by one of the first drill makers in the kingdom, expressly to win the prize, but which he always refused to sell, knowing their worthlessness. Chaff-cutters, cake-breakers, and turnip-slicers, simple machines, which have not been usefully improved for the last fifteen years, have been rewarded with small prizes, amounting altogether to about £200.

As to agricultural steam-engines, the reports of the stewards and judges contain repeated complaints that "racers," differing materially from useful farm engines, are constructed at a great cost, for the express purpose of carrying off the Society's blue riband, and this is by far the most favourable example of the prize system.

To pursue the analysis further would exhaust the patience of my hearers. Prizes may be useful to amuse and excite the public in the infancy of an art. In that point of view, perhaps, prizes for steam cultivation may, for the next few years, be useful. The distribution of prizes is a pleasant occupation for amateurs. Money may sometimes be usefully spent in assisting inventors to pursue or complete promising experiments, but looking at the difficulty of finding competent judges, the impossibility of carrying on efficient tests and trials, and the insignificant value of prizes as compared with a commercial demand for really useful articles, it is impossible to come to any other conclusion than that attempts to ascertain the comparative merits of manufactured articles by a contest for graduated prizes

is certain to be delusive, and will often encourage fraud. It is the interest of the public that the reputation of a manufacturer should not rest on winning this or that prize at an unknown sacrifice of time, thought, and money, abstracted from his regular business, but on the average quality and steady improvement of all the goods he makes. As to exceptional efforts of exceptional inventive genius, they may properly be the subject of exceptional rewards.

DISCUSSION.

The CHAIRMAN said, after the very gallant attack which had just been made upon prizes, he hoped there would be some champion who would stand up on their behalf. The question to be considered was, whether they were prepared to reject all prizes for manufactures, and to cast them aside as they had done fiscal protection to trade? He thought, perhaps, even if they were prepared to resolve at once that trade could take care of itself, and that every man knew best what he wanted, and was the best judge of it, still there might be some cases where prizes were useful; and therefore it might be desirable to try and find out, in any resolution they might form in their own minds for getting rid of prizes generally, how far they should be prepared to maintain them in particular cases. It seemed to him that they might discriminate between prizes for manufactures and prizes for certain things where, in fact, the public, assembled to judge of the result, could see at once that that result was fairly accomplished. He saw no objection to prizes for horse racing. Everybody could tell whether a horse won or not. Nor did he see any objection to prizes in flower shows; anyone could judge for himself whether one tulip was better than another. He was not sure that at archery meetings prizes were not a little stimulus to skill, and perhaps rifle shooting was encouraged by them. These were all cases where the result was patent, and where everybody was as good a judge as another. He did not know whether the author of the paper concurred in that limitation for prizes, but to his (the Chairman's) mind there was just that distinction to be drawn. He agreed with Mr. Sidney in almost all he had said in his paper, but he hoped there would be some discussion upon the subject, so as to elicit the distinction between those cases where prizes were useful and where they were not so. Mr. Sidney had alluded to the Society of Arts' Colour-box. He thought at the time that prize was offered by the Society it was very useful. It had the effect of enabling the world generally to obtain an infinitely better shilling colour-box than it had before. All trades were known to be more or less conservative, and likely to go on in the old way; and if an innovation were proposed, they often looked upon the projectors as mere enthusiasts. In the case of the colour-box, he recollected there was a sort of round-robin issued by the respectable colour-dealers, representing that, in their opinion, the Society of Arts was trenching too much upon the provinces of trade; but the practical result had been, that almost all the persons who did not approve of that action of the Society were now producing shilling colour-boxes in competition with each other. That was but a trifling instance in which prizes had been useful. There was another class of prizes which the Society had given up, which might be put in the same category—that was prizes to artists. Many years ago the Council of the Society were accustomed to give prizes to students of the Royal Academy, and they found the names of Mulready, Landseer, and Millais amongst the recipients of those prizes, who, nevertheless, might, perhaps, have been equally eminent in this art without those prizes. On the other hand, those young men might have been stimulated by those prizes to work the harder so as to distinguish themselves; and, as far as education was concerned, they had a great number of precedents in which prizes were invariably offered, and he thought they, too, ought not to be confounded with prizes given for excellence in manufactures.

Mr. G. F. WILSON, F.R.S., did not rise as an advocate

for prizes, for he thought everyone who saw anything of the prizes of the Exhibitions of 1851 in London, and of 1855 in Paris, must have felt the very great difficulty of the subject. But he thought in many cases prizes and exhibitions were a good deal associated together, and he believed it would be difficult to get a sufficient number of exhibitors together without offering some form of inducement in the shape of prizes; but that the effect would be much less amongst English exhibitors, who might be said to be as yet not thoroughly inoculated with the exhibition disease—if it were a disease; and he believed there was a much stronger feeling abroad on this subject than in England. In England there appeared to be a growing feeling, judging from those manufacturers with whom he had come in contact since 1851, in favour of exhibitions, and he believed there was an anxious looking forward to future exhibitions. He thought the question was not so much one of prizes in the abstract, but as a means of collecting together the best possible representation of the different manufactures of all parts of the world. Perhaps at the close of the discussion Mr. Sidney would favour them with his opinion upon that particular view of the subject.

Mr. WM. HAWES thought this paper was written with a very narrow view of the subject of prizes. It was confined chiefly to the smaller pecuniary rewards, and did not touch the larger branch of the question. The greatest prize they had in this country for the encouragement of manufactures, and one which he believed a large proportion of those he addressed still supported and maintained with very strong feeling, was the system of patents. If they were prepared to discard prizes to manufacturers for inventions they must come to the conclusion that granting patents—giving for a term of years a monopoly to inventors, was unnecessary and mischievous. He was one who had, for a long time, advocated that opinion, and agreeing as he did with Mr. Sidney's conclusions as applied to prizes given at international exhibitions, at the same time he did not agree with the grounds on which he arrived at these conclusions, because he believed in a great number of cases, although many foolish prizes might have been given by the Agricultural and other societies, yet, on the whole, the prizes given by such societies had done great service. He thought the principle of granting prizes as applied to international exhibitions was entirely distinct from that which governed those given by agricultural societies and other institutions as rewards for new inventions. For instance, in an international exhibition, the object of those who sent their productions was not so much to obtain a prize as to exhibit their manufactures; and the great benefit the public derived from them was the opportunity afforded to young manufacturers to bring their works prominently before the public, in a manner and under auspices which they could not accomplish by any other means, and that was a benefit greater than could be derived from the possession of a medal awarded by any jury or body of commissioners. Therefore, reasoning upon the question generally, they must not forget the conclusion they were led to, that, if they stated the principle broadly, and maintained that prizes did not encourage improvements, and that therefore they were useless—that the public were the best judges of the value of every invention, and of the benefits they would derive from using it—if they broadly maintained that principle, they must be led to the conclusion that the system of granting a monopoly to any invention or manufacture was also useless and injurious. To that conclusion they must all come, and they were coming to it rapidly. The first blow given to the old-fashioned patent system was by making patents cheap. Discussing this question with the late Mr. Brunel, when public opinion was more strongly in favour of retaining them than it now was, Mr. Brunel said, "If you cannot abolish patents altogether, make them so cheap that patents may be taken out for everything, and then they will become comparatively worthless." That was the point to which they were now tending. They had patents by thousands, and

nobody knew or cared what patents were taken out for. If any really good thing were discovered, the best thing for the discoverer was to lay it before some large manufacturer, by which means more profit would be made than by protecting his invention in the form of a patent. He agreed with Mr. Sidney, that the public were the best judges of what best answered their purpose, and that, therefore, there was no need to call in the law in the shape of patents, or prizes from the commissioners of an international exhibition to stimulate invention or production, or to induce people to buy the cheapest and best commodities of the kind they required.

Mr. PHILIP PALMER thought the fault was rather in the application of the system than in the system itself. When he joined this Society, 33 years ago, it was in the habit of issuing year after year a long list of prizes to be awarded for certain objects. The effect was not seen at the time, but many present would remember that it was the habit of gentlemen who read papers here to allude to the encouragement this Society had afforded to their early efforts. He believed they were the means of stimulating to further efforts which in after life had been satisfactory to them and beneficial to the public. He would ask Mr. Sidney in what way the merits of inventors could be recognised by the Society to which he had more particularly alluded except by a system of prizes. If the judges were prejudiced beforehand, the fault must be in the selection of the judges; but if they were to have agricultural and horticultural societies for the encouragement of different objects, in what way were their decisions to be recorded and brought before the public except by the award of prizes? If they admitted the beneficial effects of rewards for agricultural or horticultural productions, in what way were the merits of manufacturing inventions and productions to be publicly recognised? It appeared to him to be a bold stroke, in this age of testimonials, to abolish the prize system altogether, as Mr. Sidney appeared to advocate in his paper. It seemed that Mr. Sidney regarded the success of an invention as the best prize that could be awarded, but how was that success to be arrived at, unless some help up the ladder was given, by means of some public recognition or testimonial of merit, by a body qualified to pass an opinion upon the invention or production? Although he could not go to the full extent of Mr. Sidney's views, he nevertheless thought that many of the prizes of the Exhibition of 1851 had been bestowed without sufficient discrimination and judgment; and without being an advocate of the whole system, he was of opinion that prizes, under certain circumstances, should be continued, but he should like to see more judgment exercised in the distribution of them, as well as in selecting the persons by whom they were to be distributed.

Mr. NEWTON WILSON dissented from many of the views expressed that evening, both by the author of the paper and by the succeeding speakers. He was one of those who thought manufactures were not the only things in the world to be excepted from administration of prizes. If they were to exclude manufactures from prizes they ought to exclude everything else. To begin with their school days, few would deny that prizes were a great stimulus to exertion, and it would be so as long as the world lasted, whatever they might think of the propriety of awarding prizes to manufacturers. It appeared to him that the argument on which Mr. Sidney proceeded was this, that because judges were not infallible, and sometimes awarded prizes to improper things, and passed over deserving things—because one set of judges awarded a prize to a thing on one occasion, and another set of judges awarded a prize to another thing of the same kind at another time, therefore the system of prizes should be altogether abandoned. He (Mr. Wilson) did not admit the force of that argument. If it had been found that the public invariably followed the decision of the judges, there might be some force in the objection. But who did that? Everybody exercised the right of choice and judgment for himself, and was but little influenced by

the opinion expressed by the judges. The judges having pronounced favourably on an article, the public were led to examine it, and by that means the young aspirant to fame and position in the world had a greater chance of achieving his object. He thought a more comprehensive view of the subject might have been taken than had been adopted by Mr. Sidney. He had referred to the anomalies which were to be discovered in going through the prize lists of the Royal Agricultural Society, and no doubt similar anomalies might be found in the lists of any other society; but he thought if Mr. Sidney had extended his views a little further, and had regarded the effect of prizes in stimulating manufactures on the other side of the Atlantic, another conclusion might have been arrived at. From his knowledge of what had taken place in America he was much mistaken if the effect of prizes to manufactures had not been largely to stimulate their production. The prize system there had undoubtedly had the effect in many cases of bringing persons into notice, who, from the obscurity of their position might, but for the adjudication of those prizes, have fought their lives through without obtaining notice or position. It might be said that many difficulties must attend the adjudication of prizes for manufactures. He was himself an exhibitor in the coming Exhibition, and he looked forward to some distinction. He had tried hard to obtain it. He had gone to a large expenditure of time, money, and labour, to effect what might be a success or not. If he succeeded in producing effects in advance of what had been produced before, he did it to obtain distinction. He believed foreign exhibitors were actuated by the same feelings and motives, and he also believed that the distribution of rewards for superior skill was the great incentive which led them to take part in the approaching great World's Show. He thought if it had been known that no prizes were to be given, it would have had an unfavourable effect upon the Exhibition. He would ask whether he had rightly understood that there were to be no competitive prizes?

The CHAIRMAN replied, the distinction between the prizes on the present occasion and those in 1851 was this: In 1851 there were prize medals and council medals, and the latter might be regarded as competitive. In addition to that there was "honourable mention" of articles, so that in 1851 there were three grades. On the present occasion the commissioners intended to issue only one medal, for, he believed, merit of all kinds. They had not declared the limitations. Therefore, if Mr. Newton obtained a medal, and another manufacturer did not, to that extent there would be competition, but no further.

Mr. A. SOLOMONS confessed his surprise at hearing the avowal of the chairman, that he agreed for the most part with the views contained in the paper. The remark was made, in the early part of the paper, that it was difficult to find out the merits of various articles for which prizes were given. Textile fabrics were quoted as an instance of this—that they could not be judged until they were used. They were, therefore, to suppose that the gentlemen who were appointed judges did not understand the manufacture of textile fabrics on which they were called upon to give an opinion. He flattered himself that they had manufacturers who could tell whether a chair was well made without trying it by continued use, and the same with a piano or other musical instrument. If not, he thought exhibitions, instead of doing good, had done harm. There was, perhaps, a difficulty in getting the best men to act as jurors, particularly in a large exhibition like the coming one; and he thought if Dr. Playfair were asked how many had refused that office because they were themselves competitors, it would be found that there was a very large number, which was in itself a proof that those gentlemen did not regard prizes as not worth having. He knew, from good authority, that instead of having 4,000 exhibitors from France, if prizes had been withheld there would not have been 1,000; therefore it was evident that prizes were an incentive, and had brought a large number of exhibitors in the present occasion. He held in his hand a list

of the number of exhibitors, and prizes awarded, from the time of the first Exhibition in France, in the year 1798, down to the last Paris Exhibition, and it might interest the meeting to hear the results. In the year 1798 the first Exhibition took place in France. There were then 110 exhibitors only, and 23 prizes were distributed. In 1801 there were 229 exhibitors, and 80 prizes were given. In 1802 there were 540 exhibitors, and 250 prizes, consisting of 34 gold medals, 53 silver medals, 60 bronze medals, and 103 honourable mentions. In 1806 there were 1,422 exhibitors, and 610 prizes, of which 54 were gold medals, 97 silver, and 80 bronze, and 379 honourable mentions. In 1819 (thirteen years after), there were 1,662 exhibitors, 869 prizes, and the medals still increased to 80 gold, 120 silver, the number of bronze not being given. In 1823 there were 1,642 exhibitors, and 1,091 prizes. In 1827 there were 1,695 exhibitors, and 1,254 prizes. In 1834 there were 2,447 exhibitors, and 1,785 prizes. In 1839 there were 3,281 exhibitors, and 2,300 prizes. In 1844 there were 3,960 exhibitors, and 3,253 prizes. In 1849 there were 3,738 prizes distributed, and in the principal exhibition of 1855 there were 20,788 exhibitors, of whom 10,691 were French, and 10,097 foreign, including English. The prizes distributed to English exhibitors alone amounted to 1,378, of which 130 were awarded to foremen—not masters themselves, but at the head of manufactories. He thought this was pretty clear evidence of the estimation which manufacturers placed upon prizes. To pursue the subject a little further, take the exhibition of 1801; of the 19 gold medals then awarded, seven of the holders of them had obtained honourable mention at the previous Exhibition, and the same was the case with regard to 28 holders of silver medals in no less than eight instances. He could also mention a few remarks with regard to the Exhibitions at the Franklin Institute, Philadelphia. In 1850 there were 746 exhibitors and 470 prizes; in 1851 753 exhibitors and 473 prizes; in 1852, 700 exhibitors and 436 prizes. These statistics were sufficiently conclusive that prizes were desirable. He was almost inclined to think that Mr. Sidney was in this paper expressing the feelings of a disappointed man. He hoped it was not so, but from listening to the paper that impression had forced itself upon his mind, especially with regard to the proceedings of the Royal Agricultural Society. No doubt there was room for some alteration in the selection of the prizes and in the mode of distributing them, but with regard to abandoning the prize system altogether he was decidedly adverse to it.

Mr. CORBET had not had the advantage of hearing the whole of the paper, but as far as he gathered, it seemed to be somewhat of an attack upon the system of the Royal Agricultural Society. He maintained that to be one of the most useful societies in England, and the best thing they had was their prize system. The Royal Agricultural Society would not have existed three years without the prizes, and the best implements now in use were those for which the prizes of that society had been awarded; the best ploughs, harrows, drills, and above all, the best steam-plough, had been selected for distinction by the Royal Agricultural Society. The chairman had remarked that this country would not have the best race-horses without prizes; and he was sure the same remark would apply to the breeds of agricultural stock. He had attended nearly every meeting of the Royal Agricultural Society, and had acted as a judge in some of the departments. Judges might be right or wrong in their decisions, but as Englishmen he believed these were given in strict honour and integrity. Mr. Sidney had instanced the case of the reaper—one man getting the prize one year and another the next. That was the virtue of the prize system. A man found he was beaten on one occasion, and he then set to work to improve his own invention, and at the end of six or seven years, the farmer got an implement which he never would have had but for the competitive prize system.

Mr. EAMONSON thought they were indebted to Mr. Sidney for drawing attention to this subject. He had been connected with manufactures all his life, and had taken great interest in the various exhibitions that had been held. He did not think it desirable to do away entirely with rewards for merit, or that they should not in some way mark their approbation of improvements or novelties. Some kind of stimulus must be afforded. No doubt great mistakes were made in the awards of the Exhibition of 1851. There were too many prizes given, and, as far as his own opinion went, many were unworthily bestowed. It certainly seemed that in many cases the prizes were awarded from the public *prestige* of the parties, rather than from any particular merit of their productions. He thought in too many cases the heads of departments who assisted the manufacturers in bringing novelties before the public were lost sight of. He was of opinion that an order of merit, or a system of prizes, was the only way of bringing a rising man prominently before the world. As had been very properly observed, the public were not bound by the decision of the judges in their choice as to style, price, or novelty. They could judge for themselves, and would always exercise that right. The great advantage he saw in giving prizes was that they were the means of bringing before the public dormant and rising talent. In the same way that children were stimulated by prizes at school—children of larger growth were stimulated by honourable distinction with regard to their productions and inventions; and merit was entitled to distinction as much as bad actions and bad work were deserving of censure. He thought it very possible that the method of giving prizes might be improved. It might not be right to give a medal to be used as a sort of advertisement. Rewards might be given in some other form; but that was a question to be considered apart from that which was now under discussion. The next question would be, whom they were to have for judges; he thought gentlemen who were themselves exhibitors ought not to be judges of the productions of other exhibitors. He did not say that an honest man would not lay aside all considerations of friendship; but still, an exhibitor, knowing that others in the same class had personal friends amongst the jurors, might have some fear that a strictly impartial judgment might not be passed. He would have persons for judges who were not themselves exhibitors. Then came the question upon what principle were they to judge. Was it for novelty, or style, or cheapness? The merit did not consist in the mere invention alone, but in producing the greatest amount of usefulness to the public at the least possible cost. He thought they were indebted to Mr. Sidney for bringing so important a question under their consideration. He was of opinion that they should maintain an order of merit or prizes, but that these should be given in less numbers, so as to make them more valuable to their possessors.

Mr. BIGELOW (of Boston, U.S.) said he had been much connected with the Mechanics' Associations of Massachusetts, and had had the opportunity of witnessing the effects of the prize system, more particularly in New England, which was looked upon as the hot-bed of inventions and Yankee notions; and he would say that, in his opinion, the system of prizes had advanced the arts and sciences, and had promoted the improvement of machinery, particularly in the working of metals, very much indeed. The Mechanics' Association of Massachusetts, which was one of the oldest in the United States, was in the habit of holding exhibitions every three years, and these exhibitions were very noted, and brought together inventors from all parts of the United States; far more so than the more local exhibition which had been referred to—the Franklin Institute, in Philadelphia. There were three classes of prizes usually awarded. A gold medal was given for inventions of great merit and utility, but it was never awarded a second time to the same person, unless it was for some improvement upon his own invention. If he only kept up the standard of his workmanship, the

gold medal was not again awarded to him. He was sorry to say that, at the approaching Exhibition, America would be very inefficiently represented, owing, in a great measure, to the present unfortunate political position of that country, and the few American exhibitors who had come over would appear under very unfavourable circumstances. They were limited as to space, and would not be able to show their goods in a proper manner, but those who had brought their inventions hoped to receive a prize if their productions were such as to merit it. For his own part he could say he had brought over what he considered an invention of great utility, which had never been exhibited before, and he believed it would attract considerable attention, and he hoped to gain a prize. If no prizes had been given he should not have spent his time and money in bringing his invention to this country and keeping the only specimen of the machinery he had idle for six months. He was satisfied the prize system was the true way of promoting improvements. It had been found to answer well in America. They had produced some good things there, many of which had been adopted in this country.

Mr. CALLOW did not rise for the purpose of criticising the merits of Mr. Sidney's paper, but merely to remark upon the fact that no gentleman, as he was aware, who had received a medal, had spoken of the effect it had upon himself. He thought that fact tended to favour the view taken by Mr. Sidney.

Mr. SALOMONS had the satisfaction of stating that he had received a medal.

Mr. BISHOP thought considerable service would be rendered by any gentleman who would furnish a paper on the means of selecting the best jurors. It appeared to him that all that had been said led to this end. He gathered from the paper that Mr. Sidney was not so much opposed to medals themselves as to the mode in which they were distributed. In the Exhibition of 1851, a great many things came under his notice with respect to which he thought no prizes ought to have been awarded. In one department a watch was exhibited, and the prize was awarded for a novelty in the key, the hollow being placed in the watch instead of in the key. This had been used by Bréguet many years before. Mr. Bramah exhibited a lock, for which a prize was awarded on the ground that it defied picking; but he (Mr. Bishop) had picked that lock thirty years ago. Another thing which came under his notice was a specimen of printing in two colours, by one impression, to prevent forgery. That was a matter which he very easily imitated, and he sent a specimen to the jurors who awarded a prize for the invention. It was a process which was known to Albert Durer, and was one of the most simple applications of the typographical art. Again, distinction was given to Mr. Dent's clock, upon what he considered a very questionable adjustment of the fly-wheel; and in the department of preserved provisions a prize was awarded for a process which had been rejected by the Admiralty before the prize was given. Having paid a great deal of attention to the progress of mechanical improvements, he would express his opinion that prizes were a great inducement to persons to bring forward their ideas. At the last Paris Exhibition a premium was offered for an improved ships' log, when a young man, a watchmaker, with whom he was acquainted, was induced by the premium offered to send one, the result of his own ingenuity, being a competitor amongst sixty others. He agreed that the system of the distribution of medals hitherto adopted had been a great failure, but at the same time he believed they formed a great inducement to persons to try their skill.

Mr. PHILIP PALMER begged to ask whether the jurors at the forthcoming exhibition intended to call in the assistance of associate jurors, as was the case at the former exhibition?

Mr. BISHOP suggested that great assistance would be given to the jurors by the articles exhibited—especially

any great novelty—being accompanied with a full written or printed description. It would also facilitate their inspection by the public. In the Paris exhibition he affixed to his articles descriptions in three different languages, and it was his intention to follow the same plan on the present occasion.

Mr. SIDNEY said he had supported the theory of his paper by facts; his opponents had only given their individual opinions. They approved of the system of awarding prizes to competing manufacturers, as a means of rewarding "dormant talent," but they had not cited any instance of dormant talent having been thus discovered and rewarded. They said, and he agreed with them, that "merit ought to be rewarded wherever found;" but they neither explained how it was to be found, nor how it was to be rewarded, by such prizes as were generally distributed. These gentlemen confounded the advantage of an exhibition or fair—at which manufacturers, however, obscure, might make public their inventions or improvements, and find customers, who were the best possible prizes—with the fallacious results of the verdicts of juries or judges. Exhibitions did offer means of comparison, did encourage competition in quality and price, did enable obscure, inventive, and manufacturing talent to find observers and customers. But as to the assumed advantages of the prize system, they, if anywhere, should have been made manifest at the Great International Exhibition of 1851. He challenged the supporters of prize awards to competing manufacturers to show one instance, amidst the 170 Council Medals, of obscure merit thus distinguished. He (Mr. Sidney) did not ask whether it was pleasant to such persons as Messrs. Penn, Messrs. Maudslay and Field, Messrs. Whitworth, or Mr. Nasmyth, to be distinguished by Council Medals, although he believed he might safely say that every eminent English manufacturer looked on the offer of prizes with contempt, but he asked what the public gained by a nominal competition, which was really a lottery confined to a few established reputations, except in one or two instances, where the award was the result of a compromise or a job. Sir Joseph Paxton's fame was made by the building, and not enhanced by the medal which was also bestowed for "flowers embroidered on muslin." The best speech of the opposition was that of Mr. Corbet, who not having heard his paper, was very happy in combating arguments which he (Mr. Sidney) had not urged. He (Mr. Sidney) utterly denied having made, or intended to make, any attack on the Royal Agricultural Society—a society which had rendered the greatest possible service to the country by its prizes for live stock, and its exhibitions, at which breeders and manufacturers were brought in contact with their customers. Unquestionably prizes had had a large share in improving our racehorses, our cattle, and our sheep, but in these cases there was an easy trial, an admitted standard of perfection, and a large class of judges trained to the task. But he had drawn several illustrations of the failure of the prize system from the records of the Royal Agricultural Society, because they were accessible and complete for a period of twenty-two years, and in those records he found a confirmation of all the opinions laid down in his paper. A very large proportion of the sums awarded had fallen regularly year after year to great manufacturers of established reputation. For instance, two manufacturers had, in fifteen years, divided £560 out of about £650 awarded to drills, and yet all the principal manufacturers were agreed that drills could only be tested by a comparison between the work and the result many months later. He had seen forty drills in nominal competition. The confused judges took refuge in the safe course of rewarding those who had always been rewarded, and whose reputation needed no stamp. It could not be denied that corn-reaping and grass-mowing machines had been invented without rewards from the Royal Agricultural Society, and that machines of both classes had received first prizes, although quite unfit for the average work of the farmer. Steam cultivation was an established fact before the Royal Agri-

cultural Society ever offered a prize for it; but, as he had shown in his paper, the system of the Society had given premiums to toys—to colourable improvements—and to mechanical tricks, such as the Eagle mowing machine, which won the first prize at Salisbury. He could conceive rare instances in which prizes might promote the development of mechanical inventions, but in most instances money would be more wisely expended in promoting public trials, such as those of steam cultivators, without requiring a verdict from judge or jury. But, as a general rule, prizes for competing manufacturers, and especially for what might be called standard manufactures, led either to stereotyped awards, the undue prominence of a few great firms, or to sham improvements and novelties of no value, except to win the approval of amateur judges. Prizes for the invention of something much needed could do no harm. Prizes bestowed by societies on eminent merit did honour to those societies, but an invitation to manufacturers to compete with each other in the production of articles which were to be sold at a profit, was an invitation to rely on an advertisement, and not on honest work, to make something better than they ever intended to make again.

The CHAIRMAN said even if Mr. Sidney happened to be in the plight of a disappointed exhibitor, which he did not think was the case, he was quite sure he would not be disappointed in the thanks the meeting would give him for having brought this subject before their attention. A number of observations had been made, upon which, if time permitted, he should have offered some comments. With regard to the working of juries and the system of prizes, he had reported to the Board of Trade upon the Paris Exhibition of 1855, and any one who was anxious to see how the system worked in Paris would, he believed, find in that report a tolerably impartial opinion upon the subject. One gentleman had remarked upon the number of prizes awarded at the French exhibitions. He had no doubt the statistics given that evening were pretty correct, but this remarkable fact appeared in the exhibition of 1855, that with 22,000 exhibitors, 14,600 rewards of one kind or another were assigned, so that there was an exhibitor and a half for every reward. The tendency of the system in France, as he had no doubt it would be in this country, was to "make things pleasant." That was so far wholesome, because he looked to it as an extermination of the system which now intervened between the consumer and the producer, and which he thought was mischievous. A gentleman had spoken of the difficulty of getting jurors. That difficulty could scarcely be exaggerated, and if they applied the principle to themselves, he might ask them how, in the management of their business, they would select persons to judge whether they were doing a thing right or wrong. There could, however, be no doubt that prizes induced people to come forward as exhibitors. It was to be remarked that in France, where more prizes were given away than in any other country, the Exhibition of 1855 was presided over by Prince Napoleon, who had given a most emphatic opinion against the awarding of prizes; and if they took the trouble to read the report which his Imperial Highness had made upon that Exhibition, they would find that he had gone most philosophically into the whole subject of prizes, and had thoroughly exhausted it. He would only mention the heads of what he considered the Prince had proved most conclusively—the fallacy of prizes; that public consumption was the best reward; that juries were beyond public opinion, and that public opinion would best decide for itself; that the organisation of juries was vicious; and that their decisions were illusory, without harmony or consistency. He (Mr. Cole) when British Commissioner in 1855, was restricted from doing more than making his own observations upon the action of juries in France. The great object of exhibitors was to prevent anything of their own being overlooked, and, without any corrupt intention, an exhibitor or a friend of his would, perhaps, say to a juror, "Don't overlook that article;" and it need hardly be said how much influence

such a remark might have. There was an almost morbid desire on the part of the French juries to give medals to the English exhibitors. The French were so eager to reward anything of a distinguished character, that they conferred upon Professor Faraday, who was not himself an exhibitor, the high distinction of a Commander of the Legion of Honour, because a brother of the Professor was an exhibitor of a very ingenious lamp, which gave a thread of connection with Professor Faraday. It happened that there were a number of things exhibited at Paris which had nobody to back them up, and these were overlooked. He supposed they would all agree that there had been no more important invention in the present age than the uniform penny postage. At that exhibition postage stamps were exhibited, but Rowland Hill was not there, and they were passed by almost unnoticed. He believed they would also agree that there was no greater evidence of commercial activity than was displayed in the organisation and conduct of such a newspaper as the *Times*, and yet the exhibition of a copy of the *Times* in its first year of publication, together with one of the date of the Exhibition, was a matter which attracted very little attention. One gentleman had asked the question whether it was probable, that at the approaching Exhibition, associate jurors would be called in? He had no authority to state anything upon the subject of juries; but he had no doubt Dr. Playfair, who "made things pleasant" on the last occasion, would do the best he could on the present one. He would conclude by expressing a hope that, as in Paris there was a reward to every exhibitor and a half, on the present occasion they might be able to carry it out to such an extent as to give a medal to every exhibitor. He had now to propose a vote of thanks to Mr. Sidney for the gallant attack upon the system of prizes, which he had no doubt would fructify, and the next time they met to discuss this subject he had no doubt they would be more disposed to agree with him on it.

The vote of thanks having been passed,

Mr. SIDNEY acknowledged the compliment, and remarked that he had the satisfaction of knowing that the most successful manufacturers of the day were opposed to the system of prizes.

The Secretary announced that on Wednesday evening next, the 30th inst., a paper by Mr. Thomas Winkworth, "On the Silk Department of the Italian Exhibition held in Florence in 1861," would be read.

MEETINGS FOR THE ENSUING WEEK.

- MON.....R. Geographical, 8½.
British Architects, 8.
Actuaries, 7.
Medical, 8½. Dr. Cockle, "Practical Observations on Diseases of the Right Organs of the Heart."
TUES...Civil Engineers, 8. 1. Mr. James Oldham, M. Inst. C.E., "On Reclaiming Lands from Seas and Estuaries." 2. Mr. J. H. Muller, "On the Reclamation of Land from Seas and Estuaries." 3. Mr. John Paton, M. Inst. C.E., "On the Sea-dykes of Slesvig and Holstein, and Reclamation of Land from the Sea."
Royal Inst., 4. Mr. C. T. Newton, "On Ancient Art."
Zoological, 1. Annual Meeting.
WED...Society of Arts, 8. Mr. Thomas Winkworth, "On the Silk Department of the Italian Exhibition, held at Florence in 1861."
London Inst., 12. Annual Meeting
THURS...Royal, 8½.
Linnean, 8. 1. Mr. H. T. Stainton, "On the Abnormal Habits of some Females of the genus *Orygia*."
Chemical, 8.
Royal Society Club, 6.
Artists and Amateurs, 8.
Royal Inst., 2. Annual Meeting.
FRI.....Royal Inst., 8. Mr. R. Monckton Milnes, "On the International Exhibition."
Archæological Inst., 4.
R. Horticultural, 2.
SAT.....Asiatic, 3.
Royal Inst., 3. Prof. Anderson, M.D., "On Agricultural Chemistry."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par
Numb.*Delivered on April 2nd, 1862.*

126. Army (Soldiers' Institutes, Libraries, &c.)—Returns.
 136. Bankruptcy Court (London)—Return.
 65. Bill—Sir John Soane's Museum.
 Registration and Transfer of Land (South Australia and New Zealand)—Papers.
 British Columbia—Further Papers.

Delivered on 3rd April, 1862.

102. Southwark New street—Return.
 142. Red Sea and India Telegraph Company—Copy of Correspondence.
 43 (2). Trade and Navigation Accounts (28th February 1862).
 61. Local Acts—(55. Nantlle Railway; 56. Edinburgh and Glasgow Railway; Greenock and Weymiss Bay Railway; 58. Carnarvonshire Railway)—Admiralty Reports.
 66. Bills—Highways (as amended by the Select Committee).
 67. „ —Charitable Uses Act (1861) Amendment.

Delivered on 4th April, 1862.

139. Australian Exploring Expedition (Burke and Wills)—Return.
 30. Railway and Canal Bills (151. Sidmouth Railway and Harbour)—Board of Trade Report.
 92. Harbour, &c., Bills (8. Wexford Harbour Commissioners)—Board of Trade Report.
 57. Bills—Police and Improvement (Scotland).
 68. „ —Industrial and Provident Societies.
 69. „ —Law of Property Amendment (amended).

Delivered on 7th April, 1862.

- 112 (3). Civil Services—Estimates (Class 3).
 133. Landguard Point—Return.
 144. Salmon—Return.

SESSION 1861.

- 324 (A x). Poor Rates and Pauperism—Return (A).

Delivered on 8th April, 1862.

141. Curragh of Kildare—Returns.
 150. Malt—Return.
 43. Bills—Inns of Court Government.
 64. „ —Land Debentures (Ireland).
 72. „ —Stipendiary Magistrates.
 74. „ —Bills of Exchange (Ireland) Act (1861) Amendment.
 Affairs of Italy—Papers.

Delivered on 9th April, 1862.

135. Savings Banks (Number of Depositors, &c.)—Accounts.
 135 (1). Savings Banks (Sums Paid or Withdrawn, &c.)—Return.
 137. Maynooth College—Return.
 147. Army, Navy, and Ordnance Services (Excess)—Return.
 148. Advances and Repayments—Account.
 149. Navy (Training Boys)—Return.
 30. Railway and Canal Bills (152. Stockton and Darlington Railway (Towlaw and Crook), Supplemental Report; Stockton and Darlington, South Durham, and Lancashire Union, &c. Railway)—Board of Trade Reports.
 70. Bills—Judgments Law Amendment (Ireland).
 71. „ —Debentures on Land (Ireland).
 75. „ —Charitable Uses Act (1861) Amendment (amended).
 77. „ —Australian Colonies Government Act Amendment.
 78. „ —Protection of Inventions and Designs, 1862.

Delivered on 10th April, 1862.

132. Courts of Probate (London and Dublin)—Account.
 145. National Debt—Account.
 157. Army—Paper.
 158. Naval Receipt and Expenditure—Return.
 73. Bills—Public Houses (Scotland) Acts Amendment (amended).
 76. „ —Lunacy Regulation.
 79. „ —Exchequer Bonds (£1,000,000).

Delivered on 11th April, 1862.

- 112 (7). Civil Services—Estimates (Class 7).
 155. Brewers, &c.—Accounts.
 156. Excise Office, &c.—Returns.
 81. Bill—Salmon Fisheries (Scotland).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

*[From Gazette, April 18th, 1862.]**Dated 7th December, 1861.*

3038. G. Clark, 30, Craven-street, Strand—Imp. in the use, application, and manufacture of iron or steel as armour for ships or batteries.

Dated 17th December, 1862.

3163. J. Dale, Manchester—Imp. in the manufacture of glue or size.

Dated 1st January, 1862.

17. J. J. Gutknecht, Neuhof, near Fizers, Switzerland—Imp. in meters for measuring gas, water, and other fluids.

Dated 16th January, 1862.

118. J. A. Knight, 4, Symond's-inn, Chancery-lane—Imp. in machinery for dressing mill-stones by means of a diamond cutter. (A com.)

Dated 29th January, 1862.

238. B. Foster and J. Moore, Denholme, Yorkshire—Imp. in machinery or apparatus for spinning and doubling wool and other fibrous materials.

Dated 26th February, 1862.

521. J. Dothee, Paris—Imp. in the colouring or dyeing of horse-hair tresses, hats, or ornaments.

Dated 6th March, 1862.

605. G. Lawrence, Newton-terrace, Westbourne-grove—Imp. in the manufacture of flesh gloves and flesh straps.

Dated 10th March, 1862.

639. C. Massi, 13, Greville-street, Holborn—Imp. in means and apparatus for retarding and stopping carriages used on railways or common roads.

Dated 12th March, 1862.

665. J. Fawcett, New Swindon—Certain imp. in the manufacture of cranks and crank axles for locomotive and other engines.
 673. P. Gondolo, 29, Boulevard St. Martin, Paris—A new or improved baking oven.

Dated 13th March, 1862.

681. F. H. Fontaine, 15, Passage des Petites Ecuries, Paris—A process for reproducing photographs, drawings, paintings, and engravings engraved on metal.

Dated 17th March, 1862.

742. W. Gossage, Widnes, Lancashire—Imp. in the manufacture of soda and potash.

Dated 18th March, 1862.

754. A. A. Beaumont and J. A. Escalier, 4, South-street, Finsbury—A new kind of flying top.

Dated 20th March, 1862.

780. W. Clark, 53, Chancery-lane—Imp. in the manufacture of soap. (A com.)

Dated 24th March, 1862.

814. J. Topham, Nottingham—Imp. in apparatus used for cleansing out the scum and removing the sediment from the water in steam boilers, and preventing incrustation therein.
 817. J. Stewart, Glasgow—Imp. in the manufacture of cards for Jacquard weaving. (A com.)

Dated 27th March, 1862.

841. W. L. Winans, Brighton—A new or improved mode of mounting, and apparatus for manœuvring ordnance in land fortifications.
 851. E. H. C. Monckton, 5, Thurlow-place, South Kensington—Imp. in the manufacture of effervescing liquids.
 853. R. A. Brooman, 166, Fleet-street—Imp. in machinery for preparing, combing, and dressing vegetable fibres. (A com.)
 855. J. Easterbrook and J. H. Allcard, Sheffield—Imp. in vices.
 857. S. A. Emery, Arundel-street, Coventry-street, Westminster—Imp. in the manufacture of soap.
 859. W. F. Smith and A. Coventry, Salford—Imp. in and applicable to lathes and machines for turning and for cutting screws.

Dated 28th March, 1862.

861. G. Allcroft, 2, Church-row, Camberwell—Imp. in pressure and vacuum gauges.
 863. W. A. Ashe, Bolton place—An improved mode of, and apparatus for driving the propelling shafts of ships or vessels. (A com.)
 864. W. B. Nation, Battersea—Imp. in manufacturing boxes or cases, and in the machinery or apparatus employed therein.
 865. R. A. Owen, Manchester—Imp. in feathering and varying the pitch of screw propellers for steam ships.
 866. E. T. Noualhier, Paris—An improved ventilator.
 867. A. Lucetti, Glasgow—Imp. in apparatus for expressing the juice from pulpy fruit.
 869. E. Smith, Hamburg—Imp. in wet gas meters.

Dated 29th March, 1862.

871. R. Kay, Lancaster—Certain imp. in printing calicoes and other surfaces, and in apparatus connected therewith.
 873. Y. Parfrey, Upper Belgrave-place, Pimlico—Imp. in breech-loading fire-arms.
 875. I. Morris, Essington, near Wolverhampton—A new or improved machine for breaking up or cultivating land.
 876. C. H. Townsend, J. Young, and J. Hankins, Bristol—An improved method of removing and preventing incrustation in steam boilers.
 879. T. Cole, Coventry—Imp. in the manufacture of figured ribbons and other textile fabrics.
 881. R. Smith, Melksham, Wiltshire—Imp. in roller blind apparatus.
 883. E. B. Hart, New York—Improved machinery for cutting cork, so as to render the same suitable for stuffing purposes. (A com.)
 885. W. E. Newton, 66, Chancery-lane—An improved mode of applying acoustic apparatus in churches and other buildings and apartments. (A com.)

Dated 31st March, 1862.

889. R. Young, Glasgow—Imp. in apparatus for cleaning, separating, washing, and drying grain.

890. N. Frankestein, 12, Clarendon-villas, Mildmay-park—Imp. in machinery for cutting pointed, conical, and cylindrical corks. (A com.)
891. W. Tyler, Birmingham—A new or improved mixture or composition for feeding dogs and other animals, and poultry.
895. W. B. Lord, Plymouth, and F. H. Gilbert, Brixton—Imp. in loading fire arms.
897. R. C. Ransome, Ipswich—Imp. in thrashing and other machinery where corn or grain is required to be raised from one level to another.
903. H. Pooley, jun., Liverpool—Imp. in the construction of weighing machines and weigh bridges.

Dated 1st April, 1862.

905. J. T. G. Stone, 74, St. John's-road, Hoxton—An improved bustle and petticoat.
906. P. R. Couchoud, 71, Rue de Rambuteau, Paris—A new or improved loom for manufacturing chenille and other lace-work.
997. C. P. Gontard, Besançon, France—An improved stopping piece for watches and other time keepers, intended to limit the winding up of the moving spring.
913. H. Smith, Stockton-on-Tees—Imp. in apparatus used when casting iron or other metal.
915. H. W. Caslon and G. Fagg, Chiswell-street—Imp. in casting printing types, and in apparatus for rubbing the same.
917. E. Hartley, G. Little, and J. Hinchcliffe, Oldham—Imp. in rolling or straightening metal spindles, shafts, or rods of a cylindrical or tapered form.
919. H. J. Madge, Swansea—Imp. in coating iron sheets or plates, to be used as a substitute for tin or terne plates.

Dated 2nd April, 1862.

925. S. Warren, Ledbury—Imp. in machinery for transmitting motion obtained by animal power to agricultural and other machines.
927. W. Malam, Skinner-street—An imp. in the manufacture of gas, and improved apparatus to be employed in such manufacture.
929. G. Collier and J. Collier, Halifax—Imp. in looms for weaving carpets and other pile fabrics.
931. S. Hunter, Newcastle-upon-Tyne—Imp. in anchors.
933. J. T. Loft, Berwick-street, Fimlico—Improved machinery for printing in colours.

Dated 4th April, 1862.

952. J. C. Kay and W. Hartley, Bury, Lancashire—Certain imp. in steam engines.
958. H. Fletcher, 5, Cornwall-crescent, Camden-road—Imp. in valves for hydraulic presses, and in apparatus connected therewith, for making or pressing blocks or bricks of coal, or other material.
960. A. Woodhouse and T. Hunter, jun., Hindpool, Lancashire—Imp. in the arrangements of kilns and flues for burning bricks, tiles, quarries, and other like articles, and in utilising the waste heat of the said kilns, and in stoves for drying bricks, tiles, quarries, and other like articles.
964. R. A. Brooman, 166, Fleet-street—An improved case for holding balls and reels of cotton, silk, and other threads. (A com.)
968. W. E. Newton, 66, Chancery-lane—An imp. in projectiles for ordnance. (A com.)

Dated 5th April, 1862.

970. J. D. Humphreys, 11, Aldhous-terrace, Barnsbury—Imp. in furnaces, and machinery employed in the manufacture of compressed fuel and other matters.
972. W. Begg, Preston—Imp. in consuming smoke, and in furnace bars and bridges for effecting the same.
974. J. Colling, Seaham, Durham—Imp. in apparatus for reefing ships' sails.
978. T. Critchlow, Bolton-le-Moors, Lancashire—Imp. in planing machines.

Dated 7th April, 1862.

980. C. S. Duncan, Monmouth-road-north, Bayswater—An improved method of and apparatus for ventilating, cooling, or suppressing fire in public and private buildings or rooms.
982. W. Simons, Renfrew, N.B.—Imp. in constructing ships or vessels.
984. E. Welch, Stratford-on-Avon—Imp. in register stoves and fire grates, and in ovens and kitchen ranges.

Dated 8th April, 1862.

900. W. Steven, Glasgow—Imp. in apparatus for moulding or shaping clay for bricks and other like articles.
992. W. Beardmore, Glasgow—Imp. in steam rams for naval purposes.
994. J. Whitehouse, Birmingham—Imp. in the manufacture of metallic door and other knobs, and the ornaments of the pillars of metallic bedsteads, and other articles of like manufacture, and in attaching metallic mounts to china or earthenware knobs and ornaments, and roses for knobs.
996. C. P. Carter, Ashford, Kent—An instrument for inserting photographic or other pictures into, or removing them from, between the mounts of photographic albums, or other flat spaces into which the fingers cannot be inserted.
998. E. H. C. Monckton, 5, Thurlow-place, South Kensington—Imp. in timekeepers.
1000. B. Sharpe, Hanwell-park—Imp. in harrows and rakes.
1002. E. B. Sampson, Stroud—Imp. in apparatus for supplying oil or other liquid to wool, as the same is fed into carding engines.

1004. J. Wright, 42, Bridge-street, Blackfriars—Imp. in joining together armour, and other thick metal plates, beams, and girders.

Dated 9th April, 1862.

1006. S. Rodgett, Blackburn—Certain improvements in power looms for weaving.
1008. S. Farron, Ashton-under-Lyne—Imp. in machinery or apparatus for regulating the supply of steam from the boiler to the cylinder or pipes of steam engines, which improvements are also applicable to gases or fluids.
1012. W. Davies, Llanelli, Carmarthenshire—Imp. in puddling, baling, and re-heating furnaces.
1014. J. Langston, Strood—Imp. in the manufacture of Portland cement.
1016. J. Knowlden, Southwark—Imp. in steam, water, and other fluid engines.
1018. W. Mays, Shadwell—Imp. in machinery for grinding corn, grain, and other substances.

Dated 16th April, 1862.

1022. W. Armitage, Manchester—Imp. in looms for weaving.
1024. J. Houghton, 10, Foster-lane, Cheapside—An improved haversack.
1028. G. D. Mertens, 5, Royal-crescent, Margate—Imp. in the preparation of materials to be employed in the making of beer, and in the machinery or apparatus employed therein. (A com.)
1030. H. Deacon, Appleton, Lancashire—Imp. in the manufacture of caustic soda.
1032. J. Petrie, jun., Rochdale—Imp. in machinery or apparatus for blowing and exhausting air.
1034. C. Bartholomew, Broxholme, and J. Heptinstall, Masbrough—Imp. in making circular blooms, such as are used in the manufacture of tyres, and for other purposes.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1055. F. Tolhausen, 17, Rue du Faubourg Montmartre, Paris—A telegraphic dial printing apparatus. (A com.)—17th April, 1862.

PATENTS SEALED.

[From Gazette, April 18th, 1862.]

- | | |
|-----------------------------------|--------------------------------|
| <i>April 16th.</i> | 2674. E. Alexandre. |
| 2579. J. Lister and D. Myers. | 2678. H. Gilson. |
| 2795. J. R. Wigham. | 2683. M. A. F. Mennons. |
| 2583. W. T. Preston. | 2685. J. Sidebottom. |
| 2585. R. Smith & J. B. Rowcliffe. | 2727. J. L. Norton. |
| 2590. R. Aytoun. | 2733. G. Norman. |
| 2594. J. Goucher. | 2771. J. Ashley. |
| 2595. E. Peyton. | 2821. E. Loysel. |
| 2601. P. Robertson. | 2912. J. H. Johnson. |
| 2611. T. Fearnley. | 2959. J. H. Johnson. |
| 2620. H. Lamplough. | 2965. A. W. Willis. |
| 2621. C. McDougall. | 3033. W. Duchemin. |
| 2628. F. Fenton. | 223. G. H. Morgan & E. Morgan. |
| 2639. H. May. | 226. W. E. Newton. |
| 2646. H. B. Fox. | 231. F. D. De Boutteville. |
| 2642. G. Archer. | 233. J. McKean and J. Gabbott. |
| 2646. C. Brison and A. Chavanne. | 354. W. Macnab. |

[From Gazette, April 22nd, 1862.]

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|---|----------------------------|
| <i>April 22nd.</i> | 2710. R. Gibbon. |
| 2656. I. L. Pulvermacher. | 2736. L. Thomas. |
| 2657. W. B. Lord. | 2749. M. Henry. |
| 2660. A. F. Campbell. | 2760. T. Lockie. |
| 2661. T. Morris, R. Weare, and E. H. C. Monckton. | 2762. S. W. Worssam. |
| 2663. W. Dicks. | 2808. J. H. Johnson. |
| 2666. R. A. Boyd. | 2914. F. Johnson. |
| 2668. W. Wharton. | 3012. R. C. Perry. |
| 2671. E. Green and E. Green. | 162. W. Tozer and A. Read. |
| 2675. T. Moore. | 196. J. H. Johnson. |
| 2694. W. Smith. | 381. A. B. Ebbutt. |
| 2698. W. Ryder and T. Ryder. | 590. W. Tongue. |
| | 596. W. Tongue. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, April 22nd, 1862.]

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|--------------------------------|---------------------|
| <i>April 14th.</i> | 1033. T. A. Weston. |
| 943. A. McDougall. | 1046. R. Main. |
| <i>April 15th.</i> | <i>April 17th.</i> |
| 949. G. Ashcroft. | 1008. E. Clark. |
| 1002. J. Napier. | 1010. T. S. Truss. |
| <i>April 16th.</i> | 1037. E. Humphrys. |
| 924. W. A. Martin & J. Purdie. | 1060. J. Holroyd. |
| 972. J. Seaman. | <i>April 19th.</i> |
| 977. J. Freer. | 1031. G. Ward. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, April 22nd, 1862.]

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|--------------------|--------------------|
| <i>April 16th.</i> | <i>April 19th.</i> |
| 903. J. Whitworth. | 880. H. Mace. |
| <i>April 17th.</i> | |
| 886. R. Bright. | |

Journal of the Society of Arts.

FRIDAY, MAY 2, 1862.

CONVERSAZIONI.

The Council have arranged for three conversazioni at the South Kensington Museum during the time of the International Exhibition; the dates fixed are Wednesday, the 7th May, the 9th July, and the 8th October.

Cards for the 7th of May have been issued to members of the Society, with the privilege of introducing a lady. Invitations have also been sent to Her Majesty's Commissioners, the Guarantors, the Foreign Commissioners, Jurors, the principal exhibitors, and others connected with the International Exhibition.

INTERNATIONAL EXHIBITION OF 1862.

SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £451,100, have been attached to the Deed.

OPENING OF THE INTERNATIONAL EXHIBITION OF 1862.

The State opening of the International Exhibition of 1862 took place yesterday, and was in every respect a great success. The Commissioners appointed by Her Majesty to conduct the ceremony were:—His Royal Highness the Duke of Cambridge, K.G., his Grace the Archbishop of Canterbury, the Lord High Chancellor, the Earl of Derby, K.G., the Lord Chamberlain, Viscount Palmerston, K.G., G.C.B., and the Speaker of the House of Commons.

The Queen's Commissioners for opening the Exhibition assembled at Buckingham Palace, and with his Royal Highness the Crown Prince of Prussia and his Royal Highness the Prince Oscar of Sweden, escorted by the Life Guards, proceeded through Hyde-park, and arrived about

one o'clock at the entrance to the Picture Galleries in Cromwell-road, where a Guard of Honour of the Grenadier Guards was stationed. The line of road was kept by the Life and Horse Guards.

Her Majesty's Ministers, the Foreign Commissioners, and others who took part in the procession, assembled in the South Central Court at half-past twelve, and on the arrival of the Queen's Commissioners, which was announced by a flourish of trumpets, the procession was formed in the following order:—

TRUMPETERS OF THE LIFE GUARDS IN STATE UNIFORMS.

CONTRACTORS' SUPERINTENDENTS.

Mr. Clemence.	Mr. Ashton.	Mr. Wallis.
Mr. Mason.	Mr. Taylor.	Mr. Stevens.

DECORATOR.

DRAUGHTSMAN.

SURVEYOR.

J. G. Crace, Esq.	A. Meeson, Esq.	H. F. Gritten, Esq.
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SUPERINTENDENTS OF EXHIBITION ARRANGEMENTS.

Bent, Captain.	Sherson, Captain A. N.
Boose, C., Esq.	Simmonds, P. L., Esq., F.S.S.
Clark, D. K., Esq.	Smith, W., Esq.
Creswick, T., Esq., R.A.	Thompson, R. A., Esq.
Cundall, Joseph, Esq.	Traer, J. R., Esq., F.R.C.S.
Fitch, J. G. Esq., M.A.	Wallis, G., Esq.
Gibbs, T. Brandreth, Esq.	Waring, J. B., Esq., F.R.I.B.A.
Hunt, R., Esq., F.R.S.	Watson, Dr. Forbes.
Leighton, J. Esq., F.S.A.	Weld, C. R. Esq.
Moffatt, Major.	Whiting, Sydney, Esq.
Oldfield, Edmund, Esq., M.A.	Wright, T. A., Esq.
Quin, C. W., Esq., F.C.S.	
Redgrave, R., Esq., R.A.	

HER MAJESTY'S COMMISSIONERS' SUPERINTENDENTS OF BUILDING WORKS.

Captain Philpotts, R.E.	Lieutenant Brooke, R.E.
-------------------------	-------------------------

CONTRACTORS AND ARCHITECT.

John Kelk, Esq.	Thomas Lucas, Esq.
Charles Lucas, Esq.	Captain Fowke, R.E.

COUNCIL OF HORTICULTURAL SOCIETY, AND SECRETARY.

Blandy, J. J., Esq.	Godson, S. H., Esq.
Buccleugh, His Grace the Duke of.	Lee, J., Esq.
Cooper, Robert, Esq.	Pownall, H., Esq.
Clutton, J. Esq.	Saunders, W. W., Esq.
Ducie, the Right Hon. Earl of	Somers, Right Hon. Earl.
Fleming, John, Esq.	Veitch, J., jun., Esq.
Lindley, Dr., F.R.S., Secretary.	Winchester, the Right Rev. Lord Bishop of

COUNCIL OF THE SOCIETY OF ARTS, AND OFFICERS.

Alger, John, Esq.	Phillips, Sir Thomas.
Bodkin, W. H., Esq.	Wilson, G. F., Esq., F.R.S.
Cole, Henry, Esq., C.B.	Winkworth, Thomas, Esq.
Graham, Peter, Esq.	Page Wood, Vice-Chancellor Sir Wm.
Hope, H. T., Esq.	
Mackrell, W. T., Esq.	
Foster, P. Le Neve, Esq., M.A., Secretary.	
Critchett, Charles, Esq., B.A., Assistant-Secretary.	
Davenport, S. T., Esq., Financial Officer.	

DEPUTATION OF TEN GUARANTORS OF THE EXHIBITION.

Balderson, Henry, Esq.	Hollins, Michael D., Esq.
Bates, Joshua, Esq.	Lewis, Harvey, Esq., M.P.
Chambers, Dr. T. K.	Pakington, Right Hon. Sir J. S. Bart.
Coleman, Edward, Esq.	Rose, W. A., Esq., Alderman.
Fowler, Charles, Esq.	
Gurney, Samuel, Esq., M.P.	

ASSISTANT SECRETARY TO HER MAJESTY'S COMMISSIONERS FOR 1862.

Louis Lindon, Esq.

SECRETARY OF FINANCE COMMITTEE.

Lord Frederick Cavendish.

FINANCIAL OFFICER.

J. J. Mayo, Esq.

MEMBERS OF THE BUILDING COMMITTEE, AND SECRETARY.

Earl of Shelburne.

William Baker, Esq.

Hon. Edwin B. Portman, Secretary.

William Fairbairn, Esq.,
LL.D., F.R.S.

SPECIAL COMMISSIONER FOR JURIES, AND SECRETARY.

Dr. Lyon Playfair.

J. F. Iselin, Esq., M.A., Sec.

CHAIRMEN OF JURIES.

CLASS.

I. Sir Roderick Murchison,
G.C.St.S.

II. Mons. Balard.

III. Mons. Bousingault.

IV. Chev. de Schwarz.

V. Duke of Sutherland.

VI. General Morin.

VII. *W. Fairbairn, F.R.S.**

VIII. Michael Chevalier.

IX. Marquis de Perales.

X. Marquis of Salisbury, K.G.

XI. General Sir J. Burgoyne,
Bart., G.C.B.

XII. Robert Napier.

XIII. Professor Dove.

XIV. Baron Gros.

XV. Viscount de Villa
Maior.XVI. Right Hon. Sir George
Clerk, F.R.S.

XVII. Jas. Syme, F.R.S.E.

XVIII. *Thos. Bazley, M.P.*

XIX. G. Mevissen.

And the Right Hon. Lord Taunton, President of the
Council of Chairmen of Juries.

CLASS.

XX. Arles-Dufour.

XXI. Ch. Offermann.

XXII. Sylvain Van de
Weyer.

XXIII. Professor Bolley.

XXIV. Mons. Fortamps.

XXV. Gabl. Kamensky.

XXVI. Earl of Bessborough.

XXVII. Joseph Gunkel.

XXVIII. Earl Stanhope,
F.R.S.XXIX. Marquis Gustavo
Benso di Cavour.

XXX. Dr. Beeg.

XXXI. Dr. Von. Steinbeis.

XXXII. Lord Wharnccliffe.

XXXIII. Lord Stratford de
Redcliffe, G.C.B.

XXXIV. M. Pelouze.

XXXV. *Right Hon. W. E.
Gladstone, M.P.*XXXVI. *Sir Thomas Phil-
lips, F.G.S.*

ACTING COMMISSIONERS FOR COLONIES, DEPENDENCIES, &c.

Australia, West, A. Andrews, Esq.

Australia, South, F. S. Dutton, Esq.

Bahamas, S. Harris, Esq.

Barbadoes, S. Cave, Esq.,
M.P.Bermuda, W. C. Fahia
Tucker, Esq.British Columbia, Captain
Mayne.British Guiana, Sir W.
Holmes.

Canada, Sir W. F. Logan.

Ceylon, E. Rawdon Power,
Esq.Grenada, T. Hankey, Esq.,
M.P.Hong Kong, P. Campbell,
Esq.Jamaica, His Excellency C.
E. Darling, Esq.

Liberia, Gerald Ralston, Esq.

Malta, Hon. F. W. Inglott.

Hayti, J. C. Stiffel, Esq.

Mauritius, J. Morris, Esq.

Natal, W. C. Sargeant, Esq.

New Brunswick, T. Daniel,
Esq.Newfoundland, F. N. Gis-
borne, Esq.New South Wales, E. Ham-
ilton, Esq., Sir D. Cooper.New Zealand, J. Morrison,
Esq.Nova Scotia, A. Uniacke,
Esq.Prince Edward's Island, H.
Haszard, Esq.Queensland, M. H. Marsh,
Esq., M.P.

St. Vincent, Dr. Staepoole.

Tasmania, Sir. H. E. Fox
Young, C.B.

Trinidad, W. Rennie, Esq.

Vancouver's Island, Hon. A.
Laugley.

Victoria, Sir Redmond Barry.

Ionian Islands, H. Drum-
mond Wolff, Esq.

FOREIGN ACTING COMMISSIONERS.

P. C. Owen, Esq. Superintendent of Foreign Department.

Argentine Republic, J. Fair.

Austria, Count Szechenyi,

Baron de Rothschild, *Che-
valier de Schwarz*, Count

Waldstein.

Baden, Dr. Dietz.

Bavaria, *Dr. Charles Beeg.*Belgium, Charles de Grelle,
Octave Delepierre.

Brazils, W. H. Clark, Esq.

Costa Rica, G. W. Ewen,
Esq.

Denmark, A. Westenholz.

Ecuador, Don Francisco
Gaston.Egypt, Mr. Mariette, L.
Loria.

France, Mons. Le Play.

Greece, A. C. Ionides, Esq.

Guatemala, J. Samuel, Esq.

Hanover, Dr. Charles Kar-
marsch.Hanse Towns, Mons. Göschen
Mons. A. L. F. Meier.Hesse Darmstadt, Mons. F.
Fink.Italy, E. Grabau, Esq., Ca-
valiere G. Devincenzi.Netherlands, Baron Von
Brienen, S. A. Van Eyk.

The Lord Provost of Glasgow.

The Lord Mayor of Dublin.

The Lord Mayor of York.

The Lord Provost of Edinburgh.

Macebearer and Swordbearer of the City of London,
preceding

The Right Hon. William Cubitt, Lord Mayor of London.

G. J. Cockerell, Esq., | W. H. Twentyman, Esq.,
Sheriffs of London and Middlesex.

PRESIDENTS OF FOREIGN COMMISSIONS.

Belgium, Mons. *M. Fortamps.*

Hanse Towns, Mr. Rucker.

Netherlands, Mons. J. W.
L. Van Oordt.

Russia, Alexis Levshin.

Switzerland, J. Rapp, Esq.

Turkey, Nazim Bey.

United States, Colonel John-
stone.

Uruguay, E. B. Neill, Esq.

Zollverein, Mons. R. Hoene.

HER MAJESTY'S COMMISSIONERS FOR 1851, AND SE-
CRETARY.*His Grace the Duke of Buc-
cleuch, K.G., F.R.S.*Right Hon. the Earl of Rosse,
K.P., Pr. of R.S.

Right Hon. Lord Portman.

Right Hon. Lord Overstone.

Right Hon. Lord Taunton.

Right Hon. W. Cowper, M.P.

Right Hon. B. Disraeli, M.P.

Right Hon. R. Lowe, M.P.

Sir A. Spearman, Bart.

Sir C. L. Eastlake, P.R.A.,
F.R.S.

Sir C. Lyell, F.R.S.

Thomas Bazley, Esq., M.P.

T. F. Gibson, Esq.

John Gott, Esq.,

J. Hawkshaw, Esq.

A. Ramsay, Esq.

H. Thring, Esq.

E. A. Bowring, Esq. C.B.,
Secretary.HER MAJESTY'S COMMISSIONERS FOR THE EXHIBITION
OF 1862, AND SECRETARY.

The Right Hon. Earl Granville, K.G.

*His Grace the Duke of Buck-
ingham and Chandos.*Sir C. Wentworth Dilke,
Bart.

Thomas Baring, Esq., M.P.

Thomas Fairbairn, Esq.

F. R. Sandford, Esq., Secre-
tary.The Right Rev. the Lord Bishop of London,
Accompanied by the Rev. John Sinclair, M.A., the Arch-
deacon of Middlesex, and

The Rev. W. J. Irons, D.D., the Incumbent of the Parish.

* Those persons whose names are in *Italics* were in other
parts of the procession.

HER MAJESTY'S MINISTERS.

Not being either Commissioners for the Exhibition of 1862, or Special Commissioner for the Opening.

The Right Hon. C. P. Villiers, President of the Poor Law Board.

The Right Hon. E. Cardwell, Chancellor of the Duchy of Lancaster.

The Right Hon. Lord Stanley of Alderley, Postmaster-General.

The Right Hon. Thomas Milner Gibson, President of the Board of Trade.

The Right Hon. W. E. Gladstone, Chancellor of the Exchequer.

His Grace the Duke of Somerset, First Lord of the Admiralty.

The Right Hon. Sir C. Wood, Bart., G.C.B., Secretary of State for India.

The Right Hon. Sir G. Cornwall Lewis, Bart., Secretary of State for War.

His Grace the Duke of Newcastle, K.G., Secretary of State for the Colonies.

The Right Hon. Earl Russell, Secretary of State for Foreign Affairs.

The Right Hon. Sir G. Grey., Bart., G.C.B., Secretary of State for the Home Department.

HER MAJESTY'S SPECIAL COMMISSIONERS FOR THE OPENING.

His Royal Highness the Duke of Cambridge, K.G.

His Grace the Archbishop of Canterbury.

The Right Hon. Lord Westbury, Lord High Chancellor.

The Right Hon. the Earl of Derby, K.G.

The Right Hon. Viscount Sidney, Lord Chamberlain.

The Right Hon. Viscount Palmerston, K.G., G.C.B.

The Right Hon. the Speaker of the House of Commons.

ROYAL PERSONAGES ATTENDING THE OPENING.

His Royal Highness Prince Oscar of Sweden.

His Royal Highness the Crown Prince of Prussia.

Gentlemen in Attendance on Royal Personages.

Pipers of the Scots Fusileer Guards.

The procession started from the south centre of the nave, and proceeded by the south side of the nave to the western dome, where there was a Throne and chairs of State. One verse of the National Anthem was sung.

When his Royal Highness and the other Commissioners had taken their seats, Earl Granville said :—

"In the name of the Commissioners of the International Exhibition of 1862, I have the honour to present to your Royal Highness, your Lordships, and Mr. Speaker, our humble address to her Majesty. In it we respectfully offer our condolences on the irreparable loss which her Majesty and the nation have sustained, and we express our gratitude to her Majesty for having appointed your Royal Highness and your colleagues as her Majesty's representatives, and we thank the Crown Prince of Prussia and Prince Oscar of Sweden for their presence on this occasion. In it we describe the rise and progress of the Exhibition, and the manner in which we propose to reward merit. We express our thanks to the Foreign and British Commissioners who have aided us in the work, and we express a humble hope that this undertaking may not be unworthy to take its place among the periodically recurring exhibitions of the world."

Lord Granville then handed to the Duke of Cambridge the following address, of which his speech was a brief summary :—

"May it please your Royal Highness and my lords Commissioners :—

"We, the Commissioners for the Exhibition of 1862, humbly beg leave to approach her Majesty through you,

her illustrious representatives on this occasion, with the assurance of our devotion to her Majesty's throne and Royal person.

"And first of all it is our melancholy duty to convey to her Majesty the expression of our deep sympathy with her in the grievous affliction with which it has pleased the Almighty to visit her Majesty and the whole people of this realm in the death of her Royal Consort. We cannot forget that this is the anniversary of the opening of the first Great International Exhibition 11 years ago by her Majesty, when his Royal Highness, as President of the Commissioners of that Exhibition, addressed her Majesty in words that will not be forgotten. After stating the proceedings of the Commission in the discharge of their duties he concluded with a prayer that an undertaking 'which had for its end the promotion of all branches of human industry and the strengthening of the bonds of peace and friendship among all nations of the earth might, by the blessing of Divine Providence, conduce to the welfare of her Majesty's people, and be long remembered among the brightest circumstances of her Majesty's peaceful and happy reign.'

"When we commenced our duties, and until a recent period, we ventured to look forward to the time when it might be our great privilege to address her Majesty in person this day, and to show her Majesty within these walls the evidence which this Exhibition affords of the soundness of the opinion originally entertained by his Royal Highness—evidence furnished alike by the increased extent of the Exhibition, by the eagerness with which all classes of the community have sought to take part in it, and by the large expenditure incurred by individual exhibitors for the better display of their produce and machinery. We can now only repeat the assurance of our sympathy with her Majesty in that bereavement which deprives this inaugural ceremony of her Royal presence; and, while bearing mournful testimony to the loss of that invaluable assistance which his Royal Highness was so ready at all times to extend to us, we have to offer to the Queen our dutiful thanks for the interest evinced by her Majesty in this undertaking by commanding your Royal Highness and your Lordships to represent her Majesty on this occasion.

"Our respectful thanks are also due to their Royal Highnesses the Crown Prince of Prussia and Prince Oscar of Sweden, the presidents of the commissions for those countries, for the honour which their Royal Highnesses have done us in coming to England for the purpose of attending this ceremony. In the attendance of his Royal Highness the Crown Prince of Prussia we recognise a cordial deference to the wishes of our sovereign and a tribute of affection to the memory of his illustrious and beloved father-in-law.

"It now becomes our duty to submit to her Majesty a short statement of the circumstances connected with the realisation of the scheme for holding a second great International Exhibition in this country, the necessary powers for conducting which were conferred upon us by the Charter of Incorporation graciously granted to us by her Majesty in the month of February, 1861.

"In the years 1858 and 1859 the Society of Arts, a body through whose exertions the Exhibition of 1851 in great measure originated, had taken preliminary measures for the purpose of ascertaining whether a sufficiently strong feeling existed in favour of a decennial repetition of that great experiment to justify an active prosecution of the scheme. Although the result was stated by the Society of Arts to be satisfactory, the outbreak of hostilities at that moment on the continent necessarily put a stop to further proceedings.

"The restoration of peace in the summer of 1859, however, enabled the consideration of the question to be resumed, though at a period so late as to render it necessary that the Exhibition should be deferred till the present year; and the Society of Arts obtained a decisive proof of the existence of a general desire for a second great Exhi-

bition in the most satisfactory form, namely, the signatures of upwards of 1,100 individuals for various sums of from £100 to £10,000, and amounting in the whole to no less than £450,000, to a guarantee deed for raising the funds needed for the conduct of the Exhibition.

"The Commissioners for the Exhibition of 1851, mindful of the source from which their property and their continued existence as a corporate body arose, and of one of their earliest decisions, that any profits that might be derived from that Exhibition should be applied 'to purposes strictly in connection with the ends of the Exhibition, or for the establishment of similar Exhibitions for the future, without hesitation placed at our disposal, free of all charge, a space of nearly 17 acres on their Kensington Gore estate, which was at first considered sufficient for the purposes of the Exhibition, but to which at a subsequent period a further area of upwards of eight acres (being all the land which could be made available for those purposes) was added on our application, when the original space proved to be insufficient. For this grant of a site we have to express our thanks.

"To the Governments of Foreign States and of Her Majesty's Colonies our acknowledgments are justly due for the manner in which, with even greater unanimity than in 1851, they have responded to the appeal made to them to assist in this undertaking. In this cordial co-operation we find another proof that the time had arrived when a repetition of the Exhibition of 1851 had become desirable in the common interests of all nations.

"A similar tribute is due from us to those of her Majesty's subjects who appear as exhibitors, or who have placed at our disposal many valuable works to illustrate the various branches of British art, and in this respect our grateful thanks are especially due to her Majesty.

"About 22,000 exhibitors* are here represented, of whom about 8,000 are subjects of her Majesty, and 14,000 of foreign States. The arrangement and design of the building is such that the exhibited articles have been generally arranged in three great divisions:—

"1st. Fine arts, in the galleries especially provided for that department.

"2d. Raw materials, manufactures, and agricultural machinery, in the main building and the eastern annexe.

"3d. Machinery requiring steam or water power for its effectual display, in the western annexe.

"Within these divisions the classification adopted is in most respects similar to that employed in 1851, the British and colonial articles being kept separate from those sent by foreign countries, and each country having its own portion of the several departments allotted to it. The catalogues now presented by us for the purpose of submission to her Most Gracious Majesty will be found to contain all the necessary particulars respecting the articles exhibited.

"In the selection and arrangement of many of the more important branches of the Exhibition we have been materially assisted by the cordial co-operation and advice of persons of all ranks in various local, class, trade, and other committees, whose services we gratefully acknowledge.

"Following the principle adopted in the case of the Exhibition of 1851, we have decided that prizes, in the form of medals, shall be given in all classes of the Exhibition, except those in the fine arts' section; such medals, however, being of one kind only—namely, rewards for merit, without any distinction of degree. Those medals will be awarded by juries appointed for the several classes, and composed of both British and foreign members.

"We are happy to be able to acquaint her Majesty that foreign nations have selected persons of high distinction in science and industry to act as jurors; and we have to bear testimony to the cordial readiness with which eminent manufacturers of this country and other persons

distinguished in the State, as well as in the various branches of science and art, have consented to serve as jurors, and accept the responsibilities and labour entailed upon them by so doing. We feel assured that the eminence of the jurors, both foreign and British, thus selected will satisfy exhibitors that the objects displayed by them will be examined by competent as well as by impartial judges. It is certain that the meeting of so many leading men on such a duty, from all parts of the world, must exercise a favourable influence on agriculture, manufactures, and commerce, by disseminating valuable and practical information respecting the condition of science and industry in their several countries, as well as by making known to all that which they need and that which they can supply.

"The articles now exhibited will show that the period which has elapsed since 1851, although twice interrupted by European wars, has been marked by a progress previously unexampled in science, art, and manufacture.

"It is our earnest prayer that the International Exhibition of 1862, now about to be inaugurated, and which it is our privilege to conduct, may form no unworthy link in that chain of International Exhibitions with which must ever be connected the honoured name of Her Majesty's illustrious Consort."

The Duke of Cambridge read the following reply:—

"We cannot perform the duty which the Queen has done us the honour to commit to us as her Majesty's representatives on this occasion without expressing our heartfelt regret that this inaugural ceremony is deprived of her Majesty's presence by the sad bereavement which has overwhelmed the nation with universal sorrow. We share most sincerely your feelings of deep sympathy with her Majesty in the grievous affliction with which the Almighty has seen fit to visit her Majesty and the whole people of this realm. It is impossible to contemplate the spectacle this day presented to our view without being painfully reminded how great a loss we have all sustained in the illustrious Prince with whose name the first Great International Exhibition was so intimately connected, and whose enlarged views and enlightened judgment were conspicuous in his appreciation of the benefits which such undertakings are calculated to confer upon the country. We are commanded by the Queen to assure you of the warm interest which her Majesty cannot fail to take in this Exhibition, and of her Majesty's earnest wishes that its success may amply fulfil the intentions and expectations with which it was projected, and may richly reward the zeal and energy, aided by the cordial co-operation of distinguished men of various countries, by which it has been carried into execution. We heartily join in the prayer that the International Exhibition of 1862, beyond largely conducing to present enjoyment and instruction, will be hereafter recorded as an important link in the chain of International Exhibitions, by which the nations of the world may be drawn together in the noblest rivalry, and from which they may mutually derive the greatest advantages."

The procession then passed along the north side of the nave to the Eastern dome, where the special musical performances took place. The music, specially composed for this occasion, consisted of a grand overture by Meyerbeer; a chorale by Dr. Sterndale Bennett (to words by the Poet Laureate), and a Grand March by Auber. The orchestra, consisting of 2,000 voices and 400 instrumentalists, was presided over by Mr. Costa, except during the performance of Dr. Sterndale Bennett's music, which was conducted by M. Santon.

* These numbers are only approximate, the returns not yet being all made.

At the conclusion of the special music a Prayer was offered up by the Bishop of London. The Hallelujah Chorus and the National Anthem were sung. His Royal Highness the Duke of Cambridge said, "By command of the Queen I declare the Exhibition open."

This declaration having been made, it was announced to the public by a flourish of trumpets, and the firing of a salute on the site of the Exhibition of 1851. The procession then proceeded to the Picture Galleries, and the barriers were removed.

The military bands were those of the Grenadier, the Coldstream, and the Scots Fusilier Guards, conducted by Mr. Godfrey, and were stationed in the centre of the western dome.

About 25,000 persons were present.

On the 2nd and 3rd of May the price of admission will be £1 for each person; and the Commissioners reserve to themselves the power of appointing three other days, when the same charge will be made.

From the 5th to the 17th of May, 5s.

From the 19th to the 31st of May, 2s. 6d., except on one day in each week when the charge will be 5s.

After the 31st of May the price of admission except on one day in each week will be 1s.

NINETEENTH ORDINARY MEETING.

WEDNESDAY, APRIL 30TH, 1862.

The Nineteenth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 30th inst., W. Digby Wyatt, Esq., F.S.A., in the chair.

The following candidates were proposed for election as members of the Society:—

Chandler, Alfred H.	11, Leadennall-street, E.C.
Clarke, Somers	57, Regency-square, Brighton.
Collie, Alexander	Manchester.
Hopkins, Evan	{ 15, Clarendon-gardens, Maidahill, W.
Jowett, John	48, Conduit-street, W.
Lambert, Frs. Devereux...	Oakfield, West Croydon, S.
Smith, Chas. Edward.....	Fir Vale, Sheffield.
Southgate, Tufuel	{ 7, King's-bench-walk, Temple, E.C.
Wood, Richard Mason ...	89, West Smithfield, E.C.

The following candidates were balloted for and duly elected members of the Society:—

Amory, John Heathcoat..	Bolham, Tiverton
Amies, Nathaniel John...	Manchester.
Dutton, Thomas Robert.	{ Goldhawk-road, Hammer-smith, W.
Elliot, William Henry	{ 22, Austin Friars, E.C.
Fletcher	
Newcombe, S. Prout	Rose-hill, Dorking.
Noble, William	8, Onslow-pl., Brompton, S.W.
Priestley, Frederick	15, Berners-st., Oxford-st., W.
Storey, Thomas	Lancaster.
Walton, Frederick.....	{ British Grove Works, Chiswick, W.

The Paper read was—

ON THE SILK DEPARTMENT OF THE ITALIAN EXHIBITION, HELD AT FLORENCE IN 1861.

By THOMAS WINKWORTH.

The department assigned to me, in November last, as one of the deputation to report on the Italian Exhibition of 1861, held at Florence, was that of silk—raw, thrown, and manufactured. My friend and co-adjutor, Mr. Digby Wyatt, in his paper read before the Society on the 22nd of January last, has traced with a masterly hand the past and present of the fine arts in Italy, and has also, as far as such a speculation is possible or safe, given us glimpses of the future. My province is more circumscribed and prosaic, but scarcely less important in an economical point of view. I can say a little about the past, more about the present, and, from the data they furnish, venture to shadow forth a future for the silk trade of Italy.

Mr. Wyatt very naturally and correctly gives great importance to the cultivation of the fine arts as an elevating element of civilisation, but he does not forget, nor do I, that the progress will be but slow, if the means of encouragement which the profitable results of commerce ought to supply are wanting. Hence the importance of my *specialité*, silk, in the new kingdom of Italy, where it is, by natural advantages, the largest, and should be the most remunerative of all industries. With us it is an acquired trade, taking its real, but not historic, rise from one of those remarkably exceptional events by which good is occasionally evolved out of evil—the revocation of the edict of Nantes.

In Italy, on the contrary, silk is grown, thrown, and woven, without the necessity of having recourse to any external assistance, except such mechanical appliances as the ingenuity of the foreigner may supply. Such was the Jacquard, which produced a perfect revolution in the fancy branch of manufacture, by its economic adaptation, and respecting which, I regret to be obliged to say, that to the unwillingness or inability, from fiscal or other difficulties, of manufacturers to avail themselves at once, may be attributed their position in the rear of progress in this department, as compared with their competitors in France and England. No longer, however, arrested in their march of improvement by these and other impediments, and assisted perhaps by the introduction of foreign capital, Italian silk manufacturers may not only retain their present position, but recover the relative rank amongst foreign producers which they occupied from the twelfth to the sixteenth centuries.

Italy possesses advantages of climate and soil, for the production of the raw material far beyond those of other Continental states. For some centuries it was the sole country from which the manufacturers of France, England, Switzerland, and Germany could be supplied, and to the present day Italian silk is in considerable demand for the manufacture of the best class goods.

It was therefore to be expected that the samples of raw and thrown silk, of native growth, would be of great abundance, as was indeed the case. Even at the Exhibitions of 1851 and 1855 the contributions of Italy in this material exceeded those of France, Turkey, and other European producing countries, and challenged the attention of the casual visitor far beyond the raw materials required for other textile fabrics, not excepting cotton—the most important of all. Silk, in almost all conditions, is a material agreeable to the eye, and in its raw state is even fragrant. It is one of the first natural productions which engages our attention when we emerge from mere childhood; the egg, the worm, the cocoon, and the moth, affording interminable sources of wonder and delight. It is perhaps to be regretted that all efforts to render this department of industry really remunerative in this country have invariably failed; and although the by-gone records of our Society's proceedings exhibit a laudable anxiety to promote the culture of silk in this country, by giving rewards

to the candidates who produced the best qualities of the raw material, no appreciable progress has ever been made. If even in the silk-growing provinces of Italy, where the climate is less subject to rapid changes of temperature than others, the mulberry trees yet suffer occasionally from draught, wet, or cold, and the worms become diseased, and too often perish, we cannot be surprised that, in a country like ours, where the vicissitudes of the weather are proverbially sudden and intense in degree, their cultivation as a source of food to the silk-worm should be too uncertain to render it a safe and profitable speculation.

This venerable Society had not then learned the lesson that all efforts, by medals or otherwise, to call into existence or to stimulate a trade which depends upon uncertain natural resources for support, is opposed to that canon of political economy, often sneered at by the ignorant, but nevertheless sound, that "we should buy at the cheapest market and sell at the dearest." It is indeed some justification of this policy of the Society of those days, that a long and expensive war had placed the country commercially in an artificial condition, and that it was therefore generally deemed patriotic so to assist the production of raw materials for textile fabrics, however exotic and expensive, as to render us independent of supply from countries more favoured by climate and price of labour than our own. Sounder doctrines now prevail, and under no circumstances are we ever likely to return to that abnormal condition of society which prefers the unnecessary endurance of privations to the cheap enjoyment of luxuries and even of necessities, which the free and mutual exchange of commodities peculiar to each country, now so firmly established, places within our reach.

I have been rather led into this train of thought by the opportunities my visit afforded me of comparing the present condition and prospects of what is now called the kingdom of Italy with what it was when split up into petty states, as also as compared with those which still groan under Papal or Austrian rule. To trace the commencement and progress of the commerce of Italy when Republics, like that of Venice, were the prevailing form of government, is not only beside the province of a paper on a part only of the recent Exhibition at Florence, but they were so fully and eloquently set forth by Dr. Leoni Levi in his paper on "Italian Commerce and Manufactures," read here Dec. 20th, 1860, and subsequently by Mr. Wyatt, in the paper already referred to, that it would be unnecessary in me to attempt to improve upon their *resumés* of that portion of Italian history. But I may be permitted to glance at the effects in Italy of its emancipation from the paltry jealousies, fiscal exactions, and passport impediments which, until recently, operated as an incubus on the industry and talent of the people. These effects were seen to a large extent in the improvised Italian Exhibition, particularly in that department which it was my special duty to examine and report upon. At the Exhibition of 1851 and 1855 this important industry of silk was most imperfectly represented. Much appeared in 1855 as of Austrian growth, which was really of Italian, particularly of the Lombardian provinces, and much that ought to have found a place amongst the products of Italy was altogether withheld by the caprice, bigotry, and ignorance of arbitrary rulers, as in Naples and Austrian Lombardy, in 1851.

If, however, in the National Italian Exhibition of 1861, the products of Lombardy were not disguised by being described as of Austria, and those of Naples obtained a fitting field for display and competition, those of Venetia and the Papal States were almost altogether absent, there being only seven exhibitors from the former, and only two from the latter, all of raw silk, and favourably noticed by the jurors.

I may here remark, for the better understanding of technical words and expressions in the course of this paper, that the silk-worm being dependent on the greater or less abundance and condition of the mulberry tree, it is

common in Italy to treat of it indifferently as a vegetable or an insect. Thus, those who attend to the wants of the worm are not generally called breeders, but "growers." The annual yield is called the "crop," &c. The Italians also use the word "educating," as meaning the improvement of breeds or races, though it is not properly applicable either to vegetable or animal life. Still less so is the word "classical," which is often used by them to signify special and valuable qualities in the raw material.

In my examination of the splendid display of raw and thrown silks which met the eye immediately you entered the Florentine Exhibition, I was fortunate enough to be assisted by an active and intelligent Juror in that class, Signor Leopoldo Maffei, of Florence, to whom I was introduced by the banking firm of Fenzl, Hall, and Co., of that city. By this gentleman I was accompanied over the whole department, and all my inquiries answered in detail. These embraced a vast field, the result of which, as also of my own independent examinations, many times repeated during my stay at Florence, I will now endeavour to epitomise. In so doing I shall only introduce such statistics as may be necessary to illustrate or prove particular statements, partly because the anomalous condition of the new kingdom does not yet afford reliable data, and partly because the impending International Exhibition may supply a more convenient opportunity for collecting them.

In the mean time, as I succeeded in obtaining from various sources in that country some approximate details of quantities and values, which, though scanty, may be useful, I venture to introduce them here. From these materials I gather that the annual production of the silk-worm in Italy exceeds 300,000,000 francs, or £12,000,000. The evidence of this may be found in the following summary, in which I calculate francs at an exchange of 25 fr. to £1 sterling, and kilogrammes at 2lbs. of our weight, which is sufficiently near for our purpose. It appears, then, according to my authorities, that the actual quantity of cocoons produced per annum is about 49,212 tons, from which the following table may be taken as the probable division of the net produce:—

4,232 tons raw silk, which, at the price of 26s. per lb. English, would produce	£11,180,000
Besides,	
197 tons of double cocoons, which, at 8s. the lb., would be	160,000
984 tons of refuse of cocoons after reeling, for which, at 4s. per lb., could be obtained	320,000
The throwing into organzine and tram of, say —	
1,970 tons of native silk, and 984 tons imported from China and India, should produce, at the rate of 2s. 4½d. per lb.	720,000
And lastly,	
344 tons of silk consumed by the looms of Italy (the remainder being exported to foreign markets in the raw or thrown state) would produce, at the rate of £1 per lb.	350,000
	£12,730,000

From this, however, we should deduct the silk imported from India and China, but principally from the former, and always in cocoons, viz., 984 tons at 2s. 4½d. per lb., or about £24,000, leaving a net probable produce of £12,490,000.*

* As incidental to this point, viz., the purchase of foreign cocoons for the further supply of the reeling works of Italy during the comparative scarcity of native grown cocoons, large quantities have been imported via Marseilles, from Syria, Broussa, and Adrianople, as also from many of the Islands of the Greek Archipelago. Foreign cocoons are invariably reeled separately, quality differing so materially. Those of the best

Now, large as is this amount in quantity and important in value, my correspondent (M. Maffei) is of opinion that the expectations of the reporters on this class, that both will, in a comparatively short time, be doubled, fall far short of what will really be produced. This is what he says on the subject:—

“When this rich and noble industry, so eminently Italian, shall have attained—from the Tyrol to Sicily—to its complete development, that is to say—when the culture or yield of cocoons shall have reached the figure of 118,110 tons, which will be the case as soon as the Central and Southern provinces of the Peninsula shall occupy themselves with this important production with the same zeal and alacrity as is displayed by those of Piedmont and Lombardy, and when Italy shall throw and weave in her own mills and factories, not only all her fine indigenous silks, but also a large portion of those of foreign countries—then the annual revenue of this industry, instead of being doubled, as the report gives reason to hope, will doubtless exceed £40,000,000.”

He then furnishes me with estimates in illustration, which it is not necessary to quote.

I fear, however, that my friend's expectations are founded on a condition of things in Italy which cannot very soon, if ever, be fully realised. They assume continuous peaceful relations with foreign countries, harmony at home, complete freedom of trade in all branches of commerce; modern mechanical appliances by which to economise labour; the cultivation of the artistic taste which seems to be inherent in the natives of that country; and finally a project of his own, to be hereafter extended to other provinces, for the establishment at Florence, of a factory* on a large scale for the production of silk goods. M. Maffei also (and to some extent the Jurors in their report) lays considerable stress on the importance of greater liberality and further development of

quality and colour are selected by the reellers of Italy and France for the silk required for the manufacture of lace. Prices of the best white cocoons rule at about 8s. per lb. The following extract from the *Illustrated London News*, of Feb. 8, will show that the importation of cocoons is attended with many dangers and impediments, which tend to enhance the cost:—“The difficulties attending the transport of cocoons from abroad were at one time looked upon as insurmountable. The cocoon is a delicate merchandise, requiring great care. Pressure, air, and damp are fatal to it. It is like ripe fruit—good for present use, but easily injured by exposure or travel. Besides, the worm it contains cannot be destroyed without damaging its envelope or deteriorating its value. Such were the obstacles to be overcome, especially for cocoons sent to Europe from India and China. They have been conquered, and the cocoons are rendered transportable without deterioration by being spread on the ground in thin layers and submitted to the action of the sun. With this treatment not only are the chrysalis stifled, as in an oven, but they are completely dried up, and consequently there is no danger that the silk will become soiled. By means of a mechanical contrivance the cocoons are flattened, pressed together like dried figs, and arranged by layers in chests or bales, arriving in this manner at Marseilles, whence they are forwarded to the different manufacturers. This source of alimentation has proved a great boon to the French silk trade.” As additionally illustrative of the formidable character and results of this mysterious visitation, I quote as follows from a recent Californian newspaper:—“In consequence of the epidemic sometime since amongst silkworms in France, Lombardy, and other places in Europe, large numbers of silkworm eggs have been imported into these places from the Morea, Adrianople, Broussa, Persia, and China. The eggs from China are sent via San Francisco. A consignment of 1,800lbs. of these eggs—which would contain upwards of 860,000,000 in number—was expected at the above named port a short time since. Silkworm eggs are worth about 13s. per lb. in China, and from two to three guineas per lb. in Europe. France yearly consumes the product of 64,000 lbs. of silkworm eggs, and Lombardy the product of 140,000 lbs.”

* For some rather extensive speculations on this point, as regards Tuscany generally, and Florence in particular, see the translation of a paper by M. Maffei, in our *Journal* of 21st of March and 18th of April.

what he calls “Institutions of credit,” which, he says, “are very urgent and indispensable,” and which he regards as “the mainspring and most powerful lever of commerce and industry.” Those which now exist, especially in Central Italy, as he contends, exhibit parsimoniousness and pro-he found industrial apathy, and concludes his notice of this national want by the expression of an opinion that “it will continue to be so as long as the industrial and labouring classes are not represented in Parliament, and until Italy shall have emancipated herself from the deadly influence under which her independence and her greatness suffer.”

I infer from this that my friend considers the regeneration and consolidation of Italy as still incomplete, which is no doubt true to some extent, but how far his suggestion would give additional security, and therefore courage and liberality to banking establishments, is a problem I must confess my inability to solve. I am far from saying that these *desiderata* are impossibilities, but I do think that he does not sufficiently apprehend the practical difficulties which must be surmounted before this somewhat Utopian dream can be realised. I freely and cheerfully admit that recent political events demonstrate the innate capacity of his countrymen to appreciate and utilise freedom. From the long-continued prostration under which Italians formerly suffered, we had scarcely given them credit for the power of resuscitation, and for the ability to enjoy liberty without the alloy of political jealousies, flagrant shortcomings and abuses, which they have since displayed. Even an English gentleman, long resident in Florence, whose means and taste for observation, general admiration of the Italian character, and remarkable ability in recording his impressions—I mean Mr. Adolphus Trollope—in his “Tuscany in 1849–59,” expresses a doubt, after the events of 1849, whether the Italians have capacities for the realisation of their political aspirations. But we all think differently now, and admire the noble attitude of firmness and moderation which they assume under circumstances of insult on the one hand, and painfully difficult combinations on the other, whereby perfect Italian unity is indefinitely postponed.

The exhibition of RAW SILK was considered as a fair representation of the best products of the districts from whence they came, the most valuable being those of Milan, Turin, and their neighbourhood, and the greatest in quantity being the growth of Lombardy and Piedmont. For the last two or three years the quantity, but not the quality, to any considerable degree, as growers contend, has been much affected by the diseased condition of the mulberry trees, and at the time of my arrival in Italy much anxiety was felt at the continued dry weather, which, however, gave way before I left, to an apprehension that the rain which was beginning to descend might be excessive. Both these conditions were, however, deemed exceptional—the climate of the silk departments of Italy being, as I have before observed, comparatively uniform. But though, for these reasons, the produce has been below that of ordinary seasons, and has led to the purchase of cocoons from India and China to supply the mills and certain markets, still, owing to the stagnation in the silk trade, principally in France, England, Russia and Switzerland, consequent on the great outlet in America for European manufactures being almost wholly closed, this deficiency in the ordinary crops of silk in Italy has not led to increased demand, and therefore to higher prices. On the contrary, such was the deplorable condition of the trade in November last, that prices were lower instead of being higher than for some time previous, which is not now however the case.

Before I dismiss the question of production and value, we will notice the local distribution of it. We are informed by the jurors in their report that Lombardy grows less than one-fourth of the gross amount of silk in all Italy, viz., 4,232 tons; Piedmont about the same; the Venetian Provinces almost one-fifth; the Neapolitan nearly one-tenth; and Sicily less than one-twentieth. It

would seem to follow from this calculation that one-fifth is all that remains to the silk producing provinces of Emilia, Tuscany, the Marches, and Umbria, and yet I have reason to suspect that even this is more than can be honestly assigned to them.

But to proceed to an important modern phase of this eminently Italian industry, or, as it is sometimes called, agricultural variety.

The mysterious disease which of late years has affected the health of the worm, and therefore the quantity produced, seems to render it a duty that, being on the spot, and travelling through some of the more important silk districts, I should endeavour to obtain some information, which, if insufficient for the solution of the problem, might furnish materials for inquiry to the entomologist. The silk-worms of Tuscany having suffered less in proportion and later from this disease than those of other parts of Italy, it may be a question whether this comparative immunity may not be due to their Eastern origin, enabling them to resist the approaches of the disease from the greater innate stamina of the race. According to some historical authorities, the eggs of the breed in the Val d'Arno were originally imported from Persia, through Sicily, where they were first acclimatised. This theory is not, however, implicitly received, for there are those learned in such investigations who trace the introduction of the present Tuscan worm from the less remote districts of Syria, from the fact that silk-weaving was known there long before it obtained a footing in Italy. Hence they quote, in illustration of this theory, the article called "Damask," used principally for furniture, and the manufacture of which is still important compared with that of other silk. But this is a refinement of deduction which, however it may interest the curious, is hardly warranted by the scanty and obscure notices handed down to us. It has, however, been long admitted that the introduction of the silk manufacture into Europe, dating from the 13th century, is decidedly of Eastern origin, but whether from Syria, Persia, or still more remote countries, is not clearly ascertained. It is sufficient for those who assert the superiority of the worms of the Val d'Arno to those of other Italian provinces, as well in quantity as quality, to be able to show, as they indisputably can, that at all events the disease of the worm did not originate in Tuscany, where these useful insects seem to have retained, to a great extent, their primitive strength to resist infection. It appears, indeed, that whilst this hardy race was becoming bastardised and degenerate in various districts of the Peninsula, those of Casentino, the Chianti, and other Tuscan localities, still preserved their original characteristics.

As regards the disease itself, it seems to be more than probable that, besides the predisposing unhealthy condition of the mulberry trees, whether from atmospheric or other causes, it may have been aggravated by want of sufficient care on the part of the cultivators of the worm. The magnaniers or rearing houses, for instance, where the insect is nourished, or, as the French say, "educated," may be too confined and deficient in the primary necessities of fresh air and wholesome food. There is, I am told, reason to suspect that in Lombardy, where quantity was sought, at the practical, but of course unintentional expense of quality, the dimensions of the magnaniers have not been proportionately enlarged, and that of late years they have been made to do duty for double the number of worms heretofore accommodated in them. The distance between the baskets in which they feed and repose has been gradually reduced, with the natural result of impure air.

If it be said that the disease has also developed itself in the Levant, India, and Turkey, besides France and other places in Europe, where no such predisposing causes are supposed to exist, I answer that in all of them the growers have been tempted to stimulate production by increased demand (as is particularly the case, for instance, in Turkey, where since 1814 the quantity has been quadrupled), and

therefore it may fairly be assumed that the same neglect may have obtained.

But the injurious effects of this system are still more forcibly illustrated by its results in India, where, as we are informed by my friend Mr. Bashford, in an admirable paper on "Experiments with Silkworms, &c., in Bengal," read before the Society, on the 4th February, 1857, that "the rearing-houses in Bengal are of mud, or mat walls and straw-roofs; they are generally very small, and, notwithstanding the great heat, have no windows or ventilators, or any other means of lighting the room, except a single fine lattice-screened doorway; they are alike indifferent to light or temperature—to light particularly—and they have some reason for this, for without screens of lattice net work, the flies would enter and destroy every worm in two or three days; even now, millions are destroyed yearly by the flies entering the room at feeding time, and many a batch of apparently good cocoons over night has been found destroyed in the morning by maggots coming out of them from fly blows on the worms before spinning. In cold weather I have known fires used by a few at the doors of their rear-houses, but very rarely, and the good is questionable for such unventilated buildings. The fluctuations of temperature in Bengal are considerable during the year, and even in the 24 hours frequently as much as 28°; no attempt is made to equalise it in the rearing-houses, which are crammed with worms and necessarily close and offensive; our worms, therefore, passing through all these disadvantages at once prove their hardy nature. From worms generally indifferently fed, and reared in masses, in close, unventilated, and unhealthy houses, you cannot expect the best cocoons, but from the very few independent and most careful rearers, we do sometimes get a very fair quality, from 15 lbs. of which, or about 9,500 cocoons, you may reel 1 lb. of very good silk; but every batch of cocoons varies so much in quality it is impossible to fix an average; the rearers are generally very poor people, and the larger portion of them rarely produce over 100 lbs. of cocoons each bund; many even less, and they too often exceed their means and stint their worms in accomplishing this. The tendency of the larger is the same way; they rarely calculate their means, and attempt to rear a larger quantity than they have either space or food for, and satisfy themselves with quantity rather than quality." I have quoted thus fully from Mr. Bashford's paper as the paragraph tells its own melancholy tale better than I could do by any attempt at condensation. To the same authority I must refer the Society for the results of elaborate experiments under his own direction when residing in India, of crossing breeds of the worm, but which are not precisely analogous to those to which I have already incidentally referred, as obtained in Italy from similar attempts.

And here I may incidentally mention that my correspondent, M. Maffei, claims for the father of his co-juror, M. Noël Poidebarde, the merit of introducing into Tuscany, about 25 years since, the fine race of worms from China, producing white cocoons, which he cultivated with success, and on a large scale, for many years, at the villa of Prince Demidoff, near Florence. The life of this Asiatic race being eight or ten days shorter than that of other breeds, the chances of taking the poisonous infection are to that extent diminished, which is no small advantage. The fibre of the cocoons which these worms spin is soft, even, strong, and yet elastic, and without down, or what in England we call nubs. The yield is great considering the shorter span of life which the worms enjoy, and the less quantity therefore of mulberry-leaf consumed. From 24 lbs. weight of cocoons about 2 lbs. only of beautiful silk is regularly obtained, which is much in request for the manufacture of white or light-coloured goods. The demand, however, does not appear to be sufficiently constant and uniform to encourage the propagation of this superior stock into other parts of Italy, where large and heavy cocoons are at all events preferred. It appears to be a short-sighted policy for which the uncertain political

condition of other provinces before the present consolidation affords some excuse, but it is certainly unfortunate that this family of worms, of the intrinsic value of which there can be no doubt, from the extensive demand for the raw material they produce in China and export to England, should be neglected and ultimately, perhaps, become extinct.

While on the question of cocoons, it seems proper to mention that some diversity of opinion appears to exist amongst the silk merchants of Italy, as to what constitutes their real value in the present condition of production in that country. The ancient races of the Italian silk-worms, on which so much care had been expended, and on which the European reputation of the raw material they produced was founded, were almost destroyed by the terrible disease by which they and their habitations were, and to some extent still are, infected. The growers were therefore driven to the necessity of adopting such means of supplying the deficiency thus created, as were open to them, and, as before observed, recourse was naturally had to the remotest regions of the East for fresh and sound eggs. But the silk they produced being essentially different in character from that on which the reputation of native growth was based, various measures were adopted, according to the fancies of the cultivators, to render it equally valuable to home or foreign purchasers. Accordingly we find that a system of crossing the China variety, for instance, with such of the inland races as remained free from the disease, (producing silk partaking of the joint excellencies of Italy and the superior health and strength of the foreign), obtained favour with Visconti Ami e Cie., and other growers. This system is obviously susceptible of many combinations, and, assuming the theory to be sound, of which the greater or less demand for the raw material thus produced affords the best criterion, it would appear to be a happy application of a new discovery. The introduction, however, of this external element was not without its difficulties, for the foreign worms were difficult of acclimatization, and the extraordinary demand for the eggs seriously enhanced their cost. To encourage growers in this direction, the jurors specially mention with the highest approbation Professor Funghini of Perugia, Signori Antonio Finco of Verona, and Vincenzo Funghini and Francesco del Greco, both of Arezzo, for having "educated" and preserved, for the last two years, the beautiful Chinese variety imported into Italy by Count Castellani. The two first-named exhibited cocoons, and the two last the reeled silk, all of their own growth, in the midst of difficulties as to climate and disease under which large numbers of the insect were compelled to succumb and perished.

The jurors also commend Signor Carlo Niccoli of Casatima, in the province of Voghera, for successfully repeating there many trials made in other districts, to rescue the worm from what they no doubt deemed, and with justice, the enervating and artificial system of "educating" them in magnanières, by placing them on the mulberry-tree itself, and thus rendering them hardy and healthy. Of this system, his exhibition of cocoons still adhering to branches of the tree, afforded abundant evidence; and other cultivators of the silk-worm are strongly recommended to continue in the same direction. Should these efforts ultimately prove successful, they will no doubt go far to arrest the ravages of the prevailing disease, if not entirely to eradicate it, but it must not be forgotten, that though Italy may be a great European country in square miles, it is far from having such a uniform climate as would be favourable to such experiments.

It appears, indeed, that exertions are really being made in this direction, for the jurors speak of their "renowned colleague, Professor Cornalia," with a kind of praiseworthy enthusiasm, for his minute inspection under the microscope, of the eggs before hatching, as the only means of discovering their physical condition in the earliest stage of the existence of the insect, and also refer with approbation to his exhibition of cocoons spun in the open air, as well as

to his samples of cocoons and silk, the produce of eggs originally imported from China.

From all this it resulted, that the Florence Exhibition contained cocoons of all forms, colours, and structures, and that of these, few were of the old Italian species, of which some approximate notion may be formed, when I mention that one firm alone (Siccardi, Brothers, of Ceva,) exhibited no less than 78 different varieties.

But if the prevailing variety possessed more or less of the foreign element, there were not wanting specimens of the original stocks of Italy. Of these it is sufficient to quote the cocoons of Raffaello Montori and Alessandro Caroli of Teramo, which were of excellent quality and colour, preserving the primitive colour of those of Brianza (Como), which enjoy a high reputation, and those of Giuseppe Salinas Anas of Sassari, which were also of good quality, regular form, and well clothed or enveloped.

In these and other cases which might be mentioned, the cultivators appear to appreciate and act upon the theory that "sound eggs produce sound eggs," but that, in the face of the disease which has more than decimated the native races, close attention to the indispensable necessity of pure air and healthy food must be unremittingly paid. And à-propos of healthy food: I fear that the cultivators of the silk-worm do not pay sufficient attention to the quality of the leaves, for it should not be forgotten that the mulberry, like other trees, may be in a decidedly healthy condition and yet yield some bloated and otherwise diseased leaves. The demand for mulberry leaves some years since, led to what foreign agriculturists deemed a safe and profitable policy as regards this tree, and which, if the object was not simply an increase in the quantity of food, would do credit to their sagacity; I refer to the planting mulberry trees in a rich soil, and affording them abundance of manure. By topping them, also, as I saw in travelling through the district of Bergamo, where large tracts of level land were covered with stunted mulberry trees (thus presenting anything but the picturesque effect of the splendid ones of this country), the leaves they produce are greater in quantity and denser in quality, but contain so large a proportion of the fluid element, as to be infinitely less nutritious than those which are yielded in less abundance, perhaps, by the trees left to their natural growth.

Finally, on this topic, I mean, the disease of the tree or worm, or the one operating on the other, I fear we must be content to treat the visitation as one of those mysteries by which, as in the case of the vine and the potato, and in others of still greater importance, as they concern human life, particularly the Asiatic cholera, the learned in these departments of science are perplexed and left at fault. Like other natural phenomena which in past ages were held to be inscrutable or referred to occult causes, over which the most advanced intellect of those days had no control, or into which they could not dive, they may in due time be revealed by accident, and most probably by the discovery of new applications of agencies, atmospheric, electric, or otherwise, which are still so imperfectly understood as to furnish materials for research and experiment apparently inexhaustible.*

* The *Illustrated London News* of February 8th contains some valuable notices of the history and present condition of the silk trade of France, in the course of which the following statement of the effects of the disease of the worm in the silk-producing districts of that country occurs:—"The production of raw silk in France was at its apogee in 1852, when it amounted to 26,000,000 kilogrammes; in 1853 it fell to 7,500,000 kilogrammes, and the result of later years has been little more favourable. This diminution has been attributed to a deterioration in the quality of the leaves of the mulberry-tree, affected by a modern disease that seems to be spreading its ravages; and recourse was obliged to be had to the silks raised in Spain, Italy, and the Levant, which produced large but still insufficient quantities. Cocoons that sold previously, in ordinary years, at the rate of from 4s. to 5s. the kilogramme, and which in 1848 fell as low as 2s. have been raised by the

I have been compelled, by the nature of my subject, to dovetail, as it were, my notices of the cocoon into those of the reeled or raw silk material, the value of which last largely depends on the care exercised in the selection of the cocoons, and the greater or less perfection of the reeling machinery; in what remains to be said of unwoven silk, I must still be somewhat discursive.

I have been favored by Mr. P. C. Leckie, of the eminent firm of Durant and Co., Cophthall-court, with a list of the more eminent silk reellers of Italy, which, being too long for the text of my paper, I have introduced in the form of a note.*

In reporting on **THROWN SILK**, the jurors give it as their opinion that this important article of commerce has attained to the highest perfection of workmanship in Upper Italy, while it is on the decline in the Central and Southern Provinces. To this dictum these last naturally demur, and point to the demand for the organzines of Rigutino, of Counts Pieri and Nesselti, of Lombezzi, of Zavagli, of Mori, and of many others, which they maintain are quite equal to any produced by the throwsters of Piedmont or Lombardy. The organzines worked at the extensive mills of Scoti, at Pescia, in Central Italy, they say, and I believe with truth, have a higher reputation in all markets than those of any continental silk mill, except that of Blanchon, of Lyons, which is said to be superior to any other, and they are also the largest purchasers of cocoons and raw silk for their own mills in Italy. Of cocoons alone they buy to the annual extent of 200,000 lbs., producing 20,000 lbs. of raw silk when reeled off. The real cause of the diminution in quantity (omitting the exceptional years of worm disease), of thrown silk produced in the central and southern provinces, as compared with that of the north,

they find in the political impediments before mentioned, which did not prevail so vexatiously in Lombardy, where the silk industry was under the more powerful protection of Austria, as in those under kingly or ducal rule, like Naples and Tuscany, where interest in property and talent was less assured. Now, however, that all are united under one government, which is great in moral dignity as well as physical strength, all are equally protected, and we may look forward to a real trial of artistic and scientific skill between all the silk producing provinces of that most interesting country. Already they appear to have surmounted to a great extent the disastrous effects of the disease, though it is not yet by any means wholly exterminated, and producers speak with confidence as to the ultimate recovery of the trade in the raw and thrown stages of the manufacture.

In the late Exhibition, nearly 1,000 skeins of silk were exposed to competition by 278 candidates, and I have reason to know that the jurors in many cases found it difficult to decide as to relative merit, and therefore deemed it consistent with their province occasionally to base their rewards on local claims to distinction under discouraging circumstances of climate or disease; the introduction of improved machinery; the cultivation of silk where it had not previously attained to the dignity of an industry; the establishment of sanitary and social reforms in districts and in silk mills where they were previously neglected; and on other special grounds. The following exhibitors are particularly noticed for their merit on some of these, besides that to which their specimens might otherwise entitle them. I only quote names from the jurors' report, omitting, as unnecessary for this occasion, the specific reasons assigned in each case for the medals awarded. Giovan Battista Bavassana, director of the silk mills at Alessandria; Pietro Pollo, of Milan; Michele Lega, of Brisighetta, province of Ravenna; Scoti, Majeau e Compagni of Pescia, in Tuscany; Conte Giovanni Pieri, of Sienna; Olivo Masi, of Campannoli, also in Tuscany; Cavaliere Alberto Keller, of Turin; Pietro Gavazzi, of Milan; and, finally, Antonio Mangano, of Messina.

The jurors, however, did not shrink from the more paramount duty of subjecting, where necessary, the samples before them, from whatever quarter, or under whatever difficulties grown, to a process of examination new to us in this country, as far as my experience and inquiries go, by a machine which they describe as infallible in determining the evenness, cleanness (*i.e.*, freedom from floss and nubs), strength, and elasticity of the different filatures exposed to the ordeal.

Of the 325 candidates, 231 received medals, inclusive of the nine just mentioned for special merits.

SPUN SILK was cultivated to a very limited extent up to a few years since, when its value was only about 6d. per pound. The fashion, however, for foulard dresses, made first at Lyons, has occasioned so rapid and extensive a demand for this manufacture of the waste silk from cocoons, or created in the process of throwing, that the price in Italy when I was there in November last, was from 3s. to 4s. per lb., according to quality. In my journey home over Mont St. Gothard, it was my good fortune to have for sole companion in the coupé a very intelligent traveller, interested in the sale of that article, who was on his way to Lyons with samples, from which he confidently expected to make large sales. Many of these I examined, and so well were they sorted and spun, that they were almost as brilliant as organzine and tram.

There were 17 exhibitors of spun silk, seven of whom are mentioned in the report of the jurors as deserving much commendation, and they specially select the firm of Filippi Mazagova and Co., of Arona, as far before all others in the perfection to which they have arrived. It appears that their establishment was founded in 1852; that the carding is done by English machines, moved by a hydraulic meter; that they employ more than 200 artisans; and that out of 20,000 lbs. of waste per annum, they produce 10,000 lbs. of spun silk. Altogether, the number of

scarcity to 11f. and 12f. for the best, even the common qualities selling at 8f. and 9f. As a matter of course the silks produced from them obeyed the impulse, and for good qualities the price rose considerably. To obviate this scarcity, men of science in France, seconded by the Imperial Government, are seeking every means by which to ensure the health of the mulberry-tree, and the constant multiplication of the silkworm throughout the empire. At present India and China furnish yearly-increasing supplies, the silk from these countries entering for two thirds into the quantity required for the consumption of Lyons fabrics alone."

* TURIN.

Barbaroux and Co. (fil Grugliasco).
Bolmida freres.
M. Bravo et fils.
A. Keller.
Bravo Michael.

NOVI.

Casissa.
Denegri.
Peloso.
Gambarotta.

PIEDMONT.

Carnerai.
MILAN.
Gavazzi freres (Valmadesa).
P. Gavazzi (Belano).
Verza freres.
Philipo Sessa.
Talachini freres (Comezio).

COMO, LOMBARDY.

Bonsignori.
G. Perlasco.
G. Mondelli.
CREMONA, LOMBARDY
Bartazelli freres.
G. Quaranta.
CASALBUTTUNA, LOMBARDY.
Turina.
Jacini.

FOSSOMBRONE.

Agolanti.
Reali (Beretta).

COURTI.

The Grand Duke.

BERGAMO.

Piazzoni.
Zuppinger Zuber, and Co.
BRESCIA.

Belotti.

TYROL.

D. Bellini (Roveredo).
Candelperger (Roveredo).
Salvadori (Trento).
G. Climelli (Pergine).

VERONA.

Simeoni.

V. Delai.

VICENZA.

A. Maruzzi.

UDINE.

G. Fisiotti.

FLORENCE.

Dom Magnani.

NAPLES.

Angeloni.

MESSINA.

Sanderson.

BOLOGNA.

Sanguinetti.

PESARO.

A. W. D. Giovanelli.
REGGIO (CALABRIA).
Salvatore.

REGGIO (DI MODENA).

Amadio Levi.

hands engaged in this manufacture would appear to be from 12,000 to 15,000.

A certain degree of prominence is assigned to DYED SILK in the Jurors' report. It would have been more satisfactory to myself had the opportunity been afforded me of comparing the samples of Italy with the dyed silks of England, France, Prussia, and Switzerland, as will, I hope, be the case at the impending International Exhibition; with this exception, I cheerfully confirm, from careful inspection, the favourable terms in which the successful exhibitors are mentioned. From the decisions of the Jurors, I infer that the study of chemistry, especially in Piedmont and Lombardy, is cultivated to a considerable extent by this section of the trade, but I much doubt if the demand for dyed silks, which is confined to the wants of the native manufacturers, is sufficiently extensive to stimulate them to apply the discoveries of modern science in this department, particularly these of my eminent friend, Dr. Crace Calvert, of Manchester.

It appears that there were only eleven exhibitors, and that of these ten were rewarded, and they included, 1st, Francis Bruni, of Milan, for his mineral black, which, though weighted to the extent of 8, 10, 15, and 20 per cent., does not destroy the brilliancy of the silks exposed to the influence of such a trying ordeal, nor do they acquire that greasy odour which is so commonly emitted from heavy mineral dyes; and 2ndly, Saba Frontini, also of Milan, who exhibited as many as 48 samples in all colours and of striking brilliancy.

Having concluded my notices of raw, thrown, spun, and dyed silk branches, I come now to the last in the order of succession, viz., MANUFACTURED SILKS. And here I regret to say I must, to a great extent, confirm my colleague Mr. Digby Wyatt's opinion, that as far as figured or fancy woven fabrics were concerned, the specimens did not exhibit "great evidence of able design." It is true, however, that in some few instances, brocades, damasks, and other textures suitable for furniture, ecclesiastical vestments and altar decorations, attracted, and deservedly so, much attention. They contrasted favourably even with those of Lyons in 1851 and 1855, as they ought to do, for if any one country enjoys greater facilities than another for the cultivation of the purest taste, it is surely Italy, where almost from the cradle the natives breathe an atmosphere of Art. Art in all its branches and forms, and of all ages, meets the eye at every turn, and is blended as it were into the mental system, without any consciousness of the peculiarly valuable education which is thus insensibly imbibed. Some of the results of these favourable conditions obtained a fitting field for display in the Florence Exhibition. To Mr. Digby Wyatt we are indebted for bringing the greater part of them almost bodily before us, and if the fancy silk department was not necessarily limited, and therefore not susceptible of critical examination, I would endeavour to take a leaf out of his book, and make the attempt. As it is, I must content myself with saying that it afforded ample evidence of artistic ability, and that, if there were adequate encouragement, there is no obvious reason why Italian manufacturers should not successfully compete, in this expensive branch of production (damasks, brocades, &c.), with those of France. I do not add England, because it is not an industry which we particularly affect, though how soon a growing taste for church decoration may take the direction of textile embellishment, and thus create a remunerative demand, it is impossible in this age of change, precisely to predict.

The velvets of Genoa and Zoagli, particularly those of Guillot and Co., and of Chichizoli, occupied as a prominent position in the exhibition, and fully sustained their ancient renown. At present, it is far from being a remunerative branch of the silk trade, but whether from exceptional causes or because it has passed the culminating point, and is now in a state of permanent decadence, it would be difficult to decide; I fear the latter.

I may here notice, *en passant*, that the paternity of the

velvet manufacture is claimed by Tuscany, the inventor, Velluti, after whom it was called, having resided at Florence, and whose house was long carefully preserved as a relic. The present descendant of that eminent man, Simon Velluti Zati, a branch of the ducal house of St. Clement's, sold it, however, to the Archbishop of Sienna Carline, by whom it has been so altered in re-building a part of it, as no longer to exhibit its original characteristics.

Of other silks, as satins, moirés, glacés, and gros de Naples, there was a greater show than I had been led to expect from my reminiscences of the International Exhibitions of 1851 and 1855. I examined the greater part of them very carefully, and can say, with truth, that very many of the specimens exhibited would bear comparison with the best productions of England and France.

The number of exhibitors of these silks was 71, and of specimens 1,200, and they were principally, but not exclusively, from Northern Italy, many manufacturers from the Central and Southern provinces having also contributed samples of their ability.

The exhibition of ribbons was by no means extensive, and the fancy department was rather distinguished for ingenuity than taste. This will be quite understood when I mention that there were many woven imitations of engravings representing, for instance, an "Ecce Homo," and a "Madonna," as well as portraits of Count Cavour and King Victor-Emmanuel, neither of them particularly handsome, however deservedly popular. As may be supposed, these novelties attracted many spectators, but it must, I think, be admitted that the taste is somewhat questionable. These fancies, however, are not peculiar to Italy, for I now hold in my hand a recent production by one of the ribbon manufacturers of St. Etienne, which for simple skill and expression, must, I should presume, stand unrivalled. It has in the centre the portrait of a very pretty young lady of fine taste, for she wears a Tuscan bonnet trimmed with figured ribbons in lilac and light green, which harmonise with each other and with the colour of the straw. This elegant lady is enclosed in a halo of female heads, which cannot be described as a galaxy of beauty, all of them having passed the meridian of life, and one of them being a negress, adorned with the usual ornaments of ivory earrings and necklace. The whole of them are dressed in hats and bonnets trimmed with flowers, feathers, or leaves, presenting a striking contrast to the one they surround. To heighten the effect, the portraits are in black and white only, like an engraving. The object of this elaborate eccentricity was to ridicule the exclusive taste for flowers and feathers then prevailing, by which the producers of ribbon were pretty well ruined, but with what effect I am not able to report.

Out of the 71 exhibitors of manufactured silk, no less than 54 were rewarded by medals, but in no case must this distribution be considered as indicative of equal merit, for though these medals were all alike, the receivers were divided into three classes, the first, say 13 out of the 54, are described as having exhibited goods of the highest merit, 31 of second-rate merit, and the remaining 10 of sufficient merit to deserve encouragement. These are distinctly named in the report so as to deprive by its publicity candidates of comparatively inferior skill of the means of deception as to the rank they held with their more advanced competitors.

It is not necessary that I should quote names in detail from the Jurors' Report, it is sufficient for me to say that the following is a list of the more eminent exhibitors of manufactured silks, and which I have distinguished in my catalogue by the words "very good," viz., Guillot and Company, of Genoa and Turin; Giacomo Chichizola, of Genoa, and Zoagli, already mentioned; Bernardo Solei, of Turin; Ghiglieri and Company, of Milan; Innocente Osnago, of Milan; Ferdinando Brivio, of Milan; Luigi del fu Giuseppe Martini, of Milan; Costa and Seravegna, of Genoa and Turin; Cattaneo and Pettiti, of Turin; Giovan Battista fu Antonio Corti, of Como; Riva and

Company, of Como; G. L. Brun and Brothers, of Turin, and Benvenuto Maffei, of Florence.

Having treated of the past and present of this great Italian industry, it remains that I should say a few words as to its possible future.

It will be gathered from the foregoing that this trade, so important in its early career, as compared with other then existing branches of manufacture, has not maintained its ancient relative position, from circumstances for which I have endeavoured to account. Many of them, like the worm-disease, are, I trust, of only temporary duration. Already the impediments arising from the division of Italy into fractional states, with their many insecure and opposing interests, are removed by the consolidation of nearly all their separate autonomies under one constitutional king and government. The true principles of political economy are better understood, and the chimera of protection to native industry by import duties is no longer entertained. International Exhibitions have gone far to remove this illusion by demonstrating the fact that, except for the occasional necessities of revenue, those countries which displayed the greatest progress in the samples they exhibited were precisely those which were the least fettered by governmental interference. The complete introduction of free-trade does not, however, supersede, nor is it inconsistent with those encouragements which medals and other forms of distinction are intended to supply. That the Italian mind is alive to the importance and value of this new form of publicity is abundantly evident from the alacrity with which at so short notice the recent Exhibition at Florence was largely supplied with specimens of native talent and industry, and the anxiety with which they looked for the awards of the jurors.

Indeed, as a remarkably encouraging feature of Italian renovation, the jurors suggest in their report that professorial chairs, in connection with the silk industry, should be established in Florence, Naples, and Palermo, similar to that already existing at Milan, and occupied by their co-juror, M. Louis Bossi, so that students in the art may learn from a master how to apply the resources of chemistry and mechanics to the best advantage. This idea is not quite new, for central colleges were suggested in memorials to the Royal Commissioners of 1851, from Birmingham, Bristol, Halifax, Hull, Oldham, Sheffield, and the Staffordshire Potteries. I have reason also to believe that our late lamented President had elaborated a scheme of the kind into the dimensions of a college or university in this country, which would afford facilities for industrial education to the artisans, by the appointment of duly qualified professors, and by conferring honorary degrees on students exhibiting extraordinary proficiency. At all events, the Royal Commissioners of 1851, in their second report, speak very favourably of these suggestions.

There is one impediment to industrial progress in Italy which is, I hope, in process of amelioration, if not of entire removal; I allude to the excessive observance of fasts and festivals. These occur so often and, as far as abstinence from labour is concerned, are so rigidly observed, as to curtail the means of support to the people, and to beget habits of indolence, and an undue craving for excitement. Even during the short time I was in that country—rather more than four weeks—I was put to some inconvenience from this cause, especially at Genoa, where I had intended to visit some of the velvet manufacturers, whose ancient celebrity is so well known. Unfortunately, however, the only day at my disposal while there was one of the principal of these, viz., the festival of "All Saints," and the establishments of these gentlemen being hermetically sealed, I was fain to content myself with what they exhibited at Florence.

What is there, then, to obstruct Italy in its attempt to revive the silk trade in all its branches? It possesses the same genial climate as heretofore, is rich in inventive faculty, is not deficient in diligence, preserves the Divine types of the beautiful, so important to textile manufactures of luxury, produces a raw material of superior quality to

that of China, or even of France, and commands the shores of the Mediterranean and the Adriatic.

Assuming, therefore, the abatement of the expensive nuisance of excess of holidays; the complete eradication of the worm disease; the introduction of adequate capital; the application of steam power, and other improved mechanical facilities where practicable; the enlarged means of commercial intercourse with England, France, and Germany, which the sub-alpine tunnel, now in course of construction under Mont Cenis, will open up; the increase of population and, therefore, of demand, which always results from a lengthened state of peace and of high civilization; and finally, the security to life and property which constitutional government affords; assuming, I say, the realization of all or most of these conditions, we may safely predict that a glorious career of happiness and prosperity, such as already dawns on Italy, will in due time reward the patriotic devotion by which, neither deluded nor dismayed by the mysterious treaty of Villafranca, it has broken the fetters of tyranny and bigotry, emerged into a state of freedom—that first necessity of national regeneration, achieved for itself a moral, if not a physical supremacy, and risen to the dignity of true manhood in the comity of European states.

DISCUSSION.

The CHAIRMAN said he was sure they had listened with the greatest interest to the paper which had been prepared for them by Mr. Winkworth. That gentleman had, as they were aware, enjoyed peculiar facilities in preparing that paper. He possessed a most perfect knowledge of the technical details of the subject, whilst he brought to bear upon it extensive powers of observation, coupled with considerable commercial experience. He had, however, laboured under one disadvantage—that his paper had been arranged for delivery on an evening when many interested in this subject had their heads full of the following morning's engagements, and the position of their own goods and productions in the great International Exhibition. That, probably, accounted for the absence of many persons, who, under other circumstances, might have been expected to have been present there that evening. This was more particularly a subject which would greatly have interested the Italians themselves. The Italian Minister had been obliged to go to Turin, and the members of the Italian Commission were occupied with their duties elsewhere, so that they could not attend; but he knew their sympathies were enlisted when they saw how this country appreciated the efforts now making to revive some of their great commercial successes. Mr. Winkworth's paper had opened up many topics of discussion, some of them technical, and affecting the silk industry alone, and others of a more general character, on which those not connected with the trade might feel sympathy, and have much to say. One of those was the improvement of the culture of the silk-worm, and the application to that insect of those sanitary laws which were doing so much for the human race. Many of the leading Italian bankers had it in their power to bring much of the wealth of foreign countries to bear upon their national industry, and their admirable banking system was one cause which led to the success of the silk trade in Florence, and that again acted upon the arts, and provided to a great extent, at the time of their highest development, the funds necessary for carrying out the works which were so much admired in Florence. Mr. Winkworth had alluded to the interesting paper of Mr. Bashford, upon the production of silk in India, and, as they were favoured with the presence of that gentleman, perhaps he would be good enough to make some remarks upon the samples of silk which he had been kind enough to lay upon the table.

Mr. BASHFORD said, he thought very few of these present were aware of what silk was. They saw a number of skeins commonly called silk, and most persons supposed them to be actually silk, when, in reality, one-third of their mass was gum, which, before the article could be

manufactured, must be boiled out. He had brought with him some specimens of the matter from which the silk was produced in the stomach of the worm—as it existed before the insect began to spin. The gum by which the silky matter in the worm was surrounded, was necessary to enable the worm to discharge the silk. It was a misnomer to say that the worms spun. They did not spin. After feeding for a certain number of days, the insect became charged with a certain amount of this silk and gum together, and it was necessary, for its own comfort, to discharge it. When the insects were so charged Nature had ordained that a certain quantity of gum exuded from the orifices in the head of the worm, which, attaching itself to the leaf, formed the cocoon; but if the worm was put upon a flat surface the operation would be as readily performed in a flat shape instead of in the form of a cocoon. The silk, when first taken from the worm, and exposed to heat, was as brittle as spun glass. He had brought with him a specimen of what was known to anglers as fish-gut silk, to which fish-hooks were attached, which was taken out of the worm before it had had the opportunity of spinning. It was elongated by being passed through the finger and thumb till it was brought to the requisite length and fineness, and at the same time the gum was removed. He had brought some samples of cocoons from India. They were small in comparison with those of France, but they made good silk in a country where silk had been known for many centuries. He had employed 12,000 or 13,000 natives in the reeling of silk, and he was happy to say they had succeeded in this operation almost as well as Europeans. They had seen the Bengal cocoons reeled in the South of France, and they did not yield better silk than that which was produced in India, but still it bore no comparison with the Italian silk. To yield 1lb. of silk it would take about 8,000 of the Indian cocoons, whilst that weight of silk would be yielded by 3,500 or 4,000 French cocoons, and this showed the difference of size and quality. He passed several months in India, in attempting to improve the quality of the cocoons. He imported a large quantity of eggs from Lyons and crossed them with the inferior worms of India. The result had been a vast improvement, and if his health had permitted him to remain longer in the country, he believed he should have effected further improvements. He, however, could not look upon the results as permanent. In the crossing it was necessary to continue the introduction of new blood; otherwise the worms degenerated where the heat was sometimes as much as 120° or 130° in the rearing houses, as compared with 60° or 70° in Europe. Mr. Bashford then called attention to specimens, both of raw material and manufactured from the outside or refuse portion of the cocoon which, he said, formed a separate branch of business. The latter included a piece of velvet and several samples of dyed spun silk. That was a branch of manufacture which he believed had been known to the world only a few months.

Mr. THOMAS CHADWICK (upon the invitation of the Chairman.) said he was unprepared to make any observations on this subject, and had come to listen rather than take part in the discussion. He knew very little of the culture of silk, and his knowledge of reeling had been derived entirely from his own experience. He had never found any difficulty in reeling silk, and it might be interesting to those present to be informed, that silk might be reeled almost as well in England as in the country of its growth. It might be a question whether the lapse of time during the transit made any difference.

Mr. BASHFORD had never heard that the reeling was better from fresh cocoons. In France they were sometimes kept for many months before reeling. In India the cocoons could not be kept so long without reeling.

Mr. CHADWICK said, if the lapse of time involved no difficulty, silk might be as well reeled in this country as in the countries where it was produced. He had heard objections made to the climate of this country, but he did

not consider a fair bright atmosphere was necessary for the reeling of silk, any more than it was for the spinning of cotton; and he had produced as fine silk from China cocoons as had been obtained on the continent. It was well known that the inferiority of the China silk arose from the careless manner in which it was reeled. Nature gave in the cocoon a fine, even, beautiful thread, but when man came to deal with it, it was rendered imperfect. It was the imperfect and primitive method of reeling which had been practised by the Chinese for ages past, that gave inferior character to the China silk as known in this country—but if it was imported in the cocoon, they could produce any quality of thread they required. He had produced organzine from China silk, of from $4\frac{1}{2}$ to 5 deniers, while the ordinary size of silk was from 45 to 50 deniers. At the same time he admitted, that no quality of silk was equal to that which was obtained from the continent. He was satisfied that improvement in reeling was the source from which they must look for any great improvement in the silk trade of this country, and that they should import the silk in the cocoon rather than in the imperfectly reeled state in which it was obtained from China. With respect to the piece of velvet exhibited, it was woven from spun silk by the power loom, then cut in a frame, and dyed afterwards. That description of goods had been made for some years in Manchester and the neighbourhood to a large extent.

Mr. WINKWORTH said as Mr. Chadwick had alluded to the difficulty of obtaining silk sufficiently well reeled from China and India, it might be interesting to state that a short time ago he was shown, by Messrs. Durant and Co., some skeins of silk reeled after the Italian method in China, instead of being in large blocks, as usually exported to this country, beautifully white, but very unevenly reeled, and partaking in a great degree of the objections to which Mr. Chadwick had alluded. So good were these specimens, that they fetched in the market within one or two shillings per pound of the price of the best Italian silk.

Mr. BASHFORD said one reason why they did not get so good silk from China as they ought to have was that there was no established system of manufacture there. Each producer of cocoons reeled his own silk. They had no factories whatever. There was not such a thing as a filature known in China. Messrs. Jardine had lately introduced this, but that was the only instance they had at present. Each producer of a basket or two of cocoons reeled the silk in his own house, with the assistance of his wife and children, and that was the reason they had not better and more evenly reeled silk from China. The cocoons were almost as good as any produced in the world. He had seen them reeled into threads almost as fine as Italian silk. If the Chinese had a proper system of filature, they would produce as good silk as the French. It was different with the cocoons of India. There were scarcely two cocoons in a batch alike, and it required the greatest amount of native skill to enable them to give an even and perfect thread.

Mr. CHADWICK had not alluded to Indian cocoons, but to Chinese. He thought a thread could be obtained from China silk superior to that of any continental silk.

Mr. BASHFORD presumed that the making of organzine from a single thread of China silk was rather a matter of experiment than with a view to any commercial results, as there would not be sufficient strength in it for weaving.

Mr. CHADWICK had said nothing about weaving; he had merely instanced this to show the peculiar fineness of the China cocoon, whilst the China silk sent for their use was coarse, foul, and uneven. The fact which Mr. Winkworth had mentioned was not new, but it was exceptional, and only small quantities of that silk were imported, but it went to prove what he had stated, viz., that if properly reeled, beautiful silk could be obtained from China cocoons, and the reason why it was so badly reeled was because they had such imperfect machinery for the purpose.

The CHAIRMAN said that they would no doubt remember that the question of protection to the silk trade was that on which Mr. Huskisson first took his great stand in the inauguration of the free-trade movement in this country. He had the pleasure of seeing present Mr. Ogilvie, a gentleman who had given a great deal of attention to this subject, and as there was a good deal of heterodoxy in existence on this point, he should be glad if that gentleman could bring any arguments to bear which would induce the Italians to think it was to their interest to throw open their markets in any way.

Mr. OGILVIE said, many years ago they had large quantities of silk of superior quality from Italy, but of late years there had not been so much imported, but large quantities were received from other countries. From India and China the quantity had been increased, no doubt, induced, by the free-trade measures which had been adopted in this country. When Mr. Huskisson first introduced the doctrine of free trade, the duties upon silk were very high. Mr. Huskisson began with introducing foreign manufactured silks, the duty upon which had been prohibitory. At the same time it was impossible to prevent people from using silk. The Indian bandanna handkerchiefs were much in favour, and were smuggled into the country in various ways. One way was to deposit them in loaves of bread, which were thrown overboard to the boats. It was impossible to prevent the smuggling, and, therefore, it occurred to Mr. Huskisson that the revenue might be increased by admitting silks at a lower rate of duty. Those duties had been as high as 30 per cent., and whilst the duties remained at that high rate the imports of manufactured silks were very small indeed; but when Sir Robert Peel reduced them from 30 per cent. to 15 per cent. there was a considerable increase in the imports. The duties were subsequently further reduced, and now that they were entirely abolished no doubt there would be large importations of silk from all parts of the world. But he considered the importation of raw silk was more particularly affected by the measures of free trade, because we could manufacture silk in this country so largely that we stood more in need of the raw material than we did of the manufactured article. The increase in the importation of raw silk during the last thirty years had been very extraordinary. From India large quantities had been received, and as the products of that country became better known, and the means of communication there were improved, no doubt still larger quantities of silk would be received. Silk would always find a ready market, and no doubt the Italians would find it to their benefit to promote the growth of a product for which their climate was so well adapted.

The CHAIRMAN remarked that there was a process, he believed of French origination, which obtained in this country, and which was called "conditioning" the silk. He saw present a gentleman connected with a firm by whom he believed that process was employed, and he should be glad if he would inform the meeting as to the influence of that process upon the silk trade in England, more particularly in the treatment of Italian silk.

Mr. CHABOT (responding to the invitation of the Chairman) said the process alluded to had been introduced since the Exhibition of 1851, and was largely used abroad, and but slightly in this country. The object was to ascertain the amount of moisture which the silk contained. Silk absorbed a great deal of moisture, the exact percentage of which it was of great consequence to the merchant and manufacturer to ascertain, for it was frequently the case that when a merchant sold his silk, the manufacturer found it had lost more weight than was expected, which sometimes led to a suspicion of fraud, and to a great deal of unpleasantness, until some proper understanding on the subject was arrived at. By the process of conditioning, the absolute weight of the silk was ascertained, a heat above boiling point being employed to drive off all the moisture. By experiments made in Lyons, it had been discovered that silk in an absolutely dry state would afterwards

absorb from 10 to 11 per cent. of moisture in a few days.

The CHAIRMAN inquired whether the ratio of moisture absorbed varied in different kinds of raw silk?

Mr. CHABOT was not able to answer that question. It had been settled by the trade, that 11 per cent. should be added upon all silks. He believed that different kinds of silk would absorb different amounts of moisture. Referring to the point alluded to by Mr. Bashford as to the amount of gum in silk, it had been stated by that gentleman to amount to about one-third. He held in his hand the results of long experiments on that subject, by the manager of the conditioning works at Lyons, which showed that the amount of gum varied from between 20 and 25 per cent.—very seldom so much as 25 per cent., and frequently less than 20 per cent., and the China and Bengal silks contained less gum than those from Italy and France. Since the establishment of commercial relations with Japan, some silk had been received from that country, which was found to contain not more than 13 or 14 per cent. of gum.

The CHAIRMAN remarked that on a former occasion the Secretary favoured them with a paper explanatory of a loom, the invention of Mr. Bonelli, an Italian. He should therefore be glad to hear the opinion of any gentleman present as to the effect which that machinery was likely to produce upon the manufacture of silk, and what prospect there was of its employment. He believed Mr. Soper would be able to give them some information on that subject.

Mr. SOPER said he had no particular knowledge of the machine alluded to. He had the pleasure of hearing Mr. Foster's paper, and he thought the machine exceedingly pretty, which was all that could be said about it. He did not think that it was likely to come into practical use to any great extent. Passing to the subject of the effect of free trade measures upon the silk trade of this country, Mr. Ogilvie had alluded to the great increase in the importations of raw silk, and he had attributed that increase to the decrease of the duties on that article. He (Mr. Soper) had been forty years in the trade, and if he recollected rightly the duty upon China raw silk had never, during that period, been more than 3d. per pound. If that were correct he should like to know how the abolition of a duty of 3d. would have increased the importation of China silk into this country. Let them see what had been the effect of the open competition in manufactured goods. He thought all silk manufacturers would admit that the wages of the operatives had been reduced enormously. They would also admit that the profits of the manufacturers had not only been reduced but entirely extinguished. So much for the effects of free trade upon silk! Last year we imported 1,060,000 lbs. of silks—that was independent of velvets, ribbons, and plush. In the use of fancy goods they might at least put £1 upon each pound of silk for wages; and if that were true they had used foreign labour to the extent of £1,060,000, which ought to have been spent in this country, and of which the Chancellor of the Exchequer would have had his share, and the remainder would have gone to the general benefit of commerce. The profits of the manufacturers would also have been spent in the country. If, therefore, we were to estimate the effects of free trade by its results upon the silk trade in this country, he thought no person would contend that they had been of a beneficial nature.

Mr. WM. HAWES said the paper was a very interesting one, not only from the matter that was laid before them, but from the practical observations it had elicited from the various speakers. It had been shown, in the first place, that English industry had overcome all the difficulties incidental to the growth of silk in the unfavourable climate of India, and it seemed probable that an important industry would be raised up there, which would result in an increased supply of silk from that country. That would be in itself a valuable result. Then again, Mr. Chad-

wick had told them such was the perfection of machinery in England, that we were enabled to overcome all the disadvantages of dear labour and high prices, and to compete with those who reeled the silk by hand in the more primitives modes adopted in India and China. That was another important result. With regard to the decline of the silk trade in Italy, three causes had been stated for this. In the first place the bad government of the country; secondly, the high duties; and thirdly, the enormous number of feast days and holidays had been great drawbacks to the silk industry. With reference to the last-mentioned cause, the same remarks applied to other countries than Italy. In Spain a friend of his had attempted to establish a smelting establishment, but owing to the frequency of the public holidays, the operations were so often suspended that the works could not be carried on with commercial success. In Spain, as in Italy, these holidays were imposed by the religion they professed. In this country, without one of these causes to interfere with it, the industry of the silk trade had flourished. It was true we employed more silk goods than was the case before free trade was introduced. But what was the state of things in 1852, when Mr. Huskisson first inaugurated free-trade doctrines? There was a high duty on silk manufactures, but the smugglers baffled the Custom-house officers, and brought in silk at a lower price than the duty imposed. Did the gentleman who spoke last wish to go back to that period? to put a high duty upon foreign silks, and raise up an army of smugglers to defeat the politician and the revenue officer in order to supply the people with that which they were determined to have at the lowest rate? He thought we had adopted the correct policy, and it was not right to say, because we imported so many thousand pounds worth of silk, that, therefore, we displaced that amount of labour in the home market. The true political economy was that if we imported £1,000,000 worth of silk, we exported the same value in articles which we could produce at a cheaper rate than other countries. With such views as were generally held there, he could hardly imagine any one would stand up as the advocate of a retrograde movement, and go back to those high duties which had no doubt been correctly assigned as one of the principal causes of the decline of an industry in a country which had every natural advantage for its prosperity, and which the author of the paper believed, when the obstructing causes alluded to were removed, would again become as successful in the silk trade as it was in former times.

Mr. SOPER said he had been asked by the gentleman who had just sat down, whether he wished to go back again to the days of high import duties and the fostering of smuggling? If smuggling had been made felony, and the offence expiated on the treadmill, there would no doubt have been less of it. The argument of Mr. Hawes was, that if we took the produce of other countries, they would take our manufacturers in return; but mark the system which was pursued in France! We took everything of theirs duty free, but did they take our cottons duty free? Seeing the effects produced by free-trade in silk in this country, was it likely the French would allow the same to take place with respect to their cotton trade?

Mr. CHADWICK remarked, that the most prosperous period in the history of the silk trade in England, was when it was perfectly free—about two centuries ago.

The CHAIRMAN said they might now proceed to the pleasant duty of passing a vote of thanks to Mr. Winkworth for the great care, study, and attention he had brought to bear upon this subject. It was obviously one which had technical, and therefore limited interests; but it was to be remarked that oftentimes in proportion to the narrowness of the interest was its depth. When it was a subject of a general bearing, multitudes were ready to speak upon it, but this resulted in little practical

use. He thought what had been said that evening was so eminently practical that it could not have been otherwise than gratifying to his friend Mr. Winkworth to see that a paper which had been addressed to a somewhat limited interest had been taken as a basis for a most important and interesting discussion. He had intended to have offered a few remarks upon the past of the silk trade in Italy, but their attention had been so much better occupied by the practical matters which had been discussed, that he had forborne to do so.

The vote of thanks having been passed,

Mr. WINKWORTH said he felt flattered by the way in which the meeting had received the proposition of his friend in the chair. He could not, of course, shut his eyes to the fact that the subject he had to dilate upon was one not likely to attract very general attention. Nevertheless, it was one of great importance, and the fact that they had heard various portions of it commented upon, implied that it was not entirely devoid of interest. His friend having ruled that the question of free-trade was not legitimately before the meeting, and the view which he (Mr. Winkworth) took of it having been anticipated by Mr. Hawes, it would seem to be superfluous to say another word upon it; but as his friend Mr. Soper had somewhat misapprehended the real state of the question, perhaps he might be permitted, in two or three words, to put that gentleman and the meeting right. The fact was, since there had been an approximation to free-trade in silk—because it was not entirely free till the late commercial treaty was concluded—the trade flourished very largely, taking imports as a criterion. The importations of the raw material had been increased five-fold; and if we had imported five times the quantity of silk, it was obvious that five times the number of people must have been employed in the manufacture; therefore to that extent, whatever it might be, and however it might have affected individual manufacturers, the country at large must have been benefited. The present condition of our silk trade, as well as of that of cotton, was exceptional, and had arisen partly from the sudden relaxation of all duties upon silk, but principally from the trade with America being partially closed. He had found that both in Italy and France they attributed the badness of trade to the condition which the state of things on the other side of the Atlantic had produced.

The Secretary announced that on Wednesday evening, May 14th, a paper by Mr. John Arthur Phillips, "On Gold Mining and the Gold Discoveries made since 1851," would be read.

MACHINE FOR CUTTING OVALS.

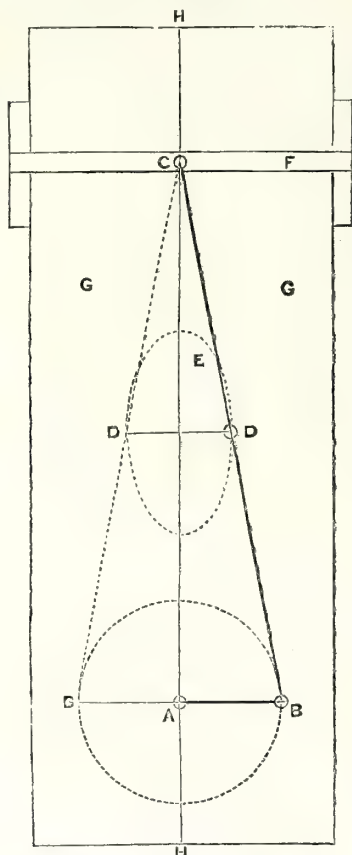
A simple machine for this purpose has been invented by Mr. Robert McAllister. In a letter dated Island-bridge near Dublin, he says:—

"The instrument consists merely of a board with two or three mahogany bars with pivots, and a cutting tool, of simple construction, for cutting out the ovals in card or wood. I annex a diagram.

"*a* is a fixed centre, round which the point *b* revolves; *c* is a parallel slide, moving in the centre line *h h*; *d* is a point in a connecting bar joining the points *b c*; *f* parallel sliding plane; *g* the board.

"Now, if the point *b* be made to revolve round its centre *a* (the point *c* also in motion), any point, say *d* in the connecting bar, will describe an ellipse *e*, whose major axis is equal to the distance *b b*, and whose minor axis is equal to *d d*. I have not seen this problem in any geometrical work. As a draughtsman I find the instrument of very great service. It suits well for making moulds of concentric

ellipses, which can be made from one inch to twelve inches in length, or longer if necessary."



Dome Correspondence.

ELASTIC GUMS.

SIR,—I should have earlier replied to Mr. Charles Hancock's letter, published in your *Journal* of April 18th, but I waited for an answer to an inquiry addressed to him in reference to the communication by Dr. Ure, on the subject of oxydised oil. I had searched the *Mechanics' Magazine* from the year 1840 to 1843, in order to find the publication thereof, but without success; and now, applying to Mr. Hancock for a more specific date, I am informed by him that "he is not aware if it was inserted in the magazine or not."

Mr. Charles Hancock obtained a patent in 1842 for "certain improvements in printing cotton, wool, &c.," in which he claims the printing of fabrics with highly-boiled oil combined with pigments, and this being the date named in his letter, was, I presume, the result of his experiments on this subject.

Anyone interested in the matter will at once perceive the wide difference between this and my own claim in the patent, granted to me in 1860, for "Improvements in the manufacture of varnish, and in treating oils, and in the application of products obtained therefrom," and which will be found to be a "New substance analogous to the elastic and pliable gums."

Mr. Hancock does not furnish the date when he made this experiment on this material as an insulator. His opinion of its merits is valued by me, and I do not think he will deny that this application also of oxydised

oil, either alone or in combination with other gums or resins, as claimed in my patent of November, 1860, for "Improvements in insulating telegraphic conductors," was also new at the date thereof.

It will give me pleasure at all times, while pursuing my experiments, to have, under proper arrangements, the co-operation of any who have had so much experience in the treatment and use of elastic and pliable gums.

I beg to thank Mr. Charles Hancock for the correction of an error made most inadvertently by me in the paper I had the honour to read before your Society on the 2nd of April.

I should be very sorry intentionally to detract from, or improperly attribute, the credit due to anyone—either for the publication of valuable information or the discovery of interesting and useful improvements in any branch of manufacture.

I am, &c.,

FREDERICK WALTON.

British Grove Works, Chiswick, April, 23rd, 1862.

Proceedings of Institutions.

BURNLEY MECHANICS' INSTITUTION.—The report for the year 1861 says that since the removal of the Institution to the new building its progress has been remarkable. At the time of removal in the year 1855, the number of members on the books was 220, at the close of 1862 the number reached 681, while since the removal, the several departments of the Institution have been rendered more efficient and complete. The year 1861 may be regarded as exceptional. The rapid and continuous increase of members which has of late distinguished this Institution, has, during the past year, been interrupted. The number of members on the register for the last quarter of 1861, was 666, showing a decrease for the year of 15. The directors however are confident that the diminished list of members has not been caused by diminished interest in the Institution, but solely by the depression of the great staple manufacture of this district, and from an apprehension of its continuance. The evening classes during the year 1861 have been conducted with more than usual success. The number of members on the class registers for the quarter commencing October last, is 345, comprising 218 males and 127 females, the average attendance being greater and the progress of the scholars more decided than at any former period. It is gratifying to report that many members have been so eager to resume their duties that the directors have found it necessary to open the classes this season a month earlier than usual. The proficiency which many of the members have attained will be best understood by stating,—that to 5, certificates have been awarded by the Society of Arts,—that the Council of the Lancashire and Cheshire Association of Mechanics' Institutes have awarded to three of the members of this Institution, certificates of the first class, and to one of them, Robert Brown, in addition, for a prize essay, an award of £2, the gift of the Earl of Ellesmere; to four members, certificates of the second class, and to one of them, Elizabeth Whitaker, a prize of £1, for a paper on domestic economy and household accounts; to five members, certificates of the third class, and to six members honourable mention,—and that at the last examination of the East Lancashire Union, the Members of the Burnley Mechanics' Institution won the chief honours. The book prizes presented at the annual *soirée* were not awarded for proficiency, but for perseverance. The prizes given at this Institution are intended to encourage members of humble as well as of advanced attainments who distinguish themselves by industry and improvement. The Rev. J. Binns, M.A., one of her Majesty's Inspectors of Schools, thus reports:—"The night schools in connection with the Burnley Mechanics' Institution continue to be conducted with great energy and success. The teachers, 12 males and three females, are actively engaged in their several

departments. The highest class of male scholars in addition to the usual subjects, have, during the past year, applied themselves to grammatical analysis and mathematics with satisfactory results. There is a local School of Art which receives due support. The female students are regularly instructed in needlework, and their progress in other subjects appears to be sound and efficient." The course of instruction in the female classes at present includes, reading, writing, arithmetic, grammar, composition, geography, domestic economy, plain and fancy needlework, and cutting out; in the male classes, reading, writing, arithmetic, book-keeping, mathematics, grammar, composition, geography, elocution, drawing, chemistry, and vocal music. It is deemed advisable still further to enlarge the library previously to placing the new catalogue in the printer's hands. A selection of 333 vols. of miscellaneous literature has been purchased at a cost of £64 17s. 9d., which, with six vols. that have been presented, has increased the number of volumes to 4,212. The number of books issued from the library during the year is 6,330, a fair proportion of them being of a usual and instructive description; the issue of reviews, magazines, and periodicals, amounts to 662, and the volumes circulated by the book club to 205. The new catalogue is now printed, and that it may be within reach of every member of the Institution, the price has been fixed at the small sum of 6d. a copy. The present derangement of commerce, which may be ascribed principally to the disastrous civil war now raging in America, has rendered early intelligence, both foreign and domestic, highly important to commercial men. The directors have therefore effected an arrangement for the supply by telegraph of morning, midday, and evening expresses of leading news to the Exchange. These expresses commenced on the 1st of September last, and are furnished at the annual charge of £13, in addition to the previous charges for market reports. Several desirable improvements, both in the Exchange and the Institution, might be enumerated, the directors, however, with the limited means at their command, can only gradually carry out such as appear the most urgent. The financial statement for the year shows that the expenditure has been £621 12s. 3d., and that the balance due to the treasurer is £50 16s. 7d. The excess of payments is certainly greater than was anticipated, but the entire debt is considerably below the large extra amount expended on the catalogue and the library.

MEETINGS FOR THE ENSUING WEEK.

- MON.....**Entomological, 7.
British Architects, 8. Annual Meeting.
Geologists' Association, 7. Mr. George E. Roberts, "On Bone-beds: their Position in Sedimentary Strata, and Probable Origin."
Royal Inst., 2. General Monthly Meeting.
Royal United Service Inst., 8½. Mr. John Latham, "On the Shape of Sword Blades."
- TUES. ...**Civil Engineers, 8. 1. Continuation of the Paper by Mr. John Paton, "On the Sea-dykes of Slesvig and Holstein, and Reclamation of Land from the Sea." 2. Mr. James Oldham, "On Reclaiming Lands from Seas and Estuaries." 3. Mr. J. H. Muller, "On the Reclamation of Land from Seas and Estuaries."
- Pathological, 8.
Photographic, 8.
Ethnological, 8. 1. Mr. John Crawford, President, "On Commixture of Races of Man in Europe." 2. Dr. Shortt, "Notes on Strength and Weight of the Europeans and Asiatics." 3. Mr. Charles Carter Blake, "On some Peruvian Shells."
- Architectural Museum, South Kensington, 8. Mr. W. Burges, "On the Various Systems of Coloured Decoration of the Middle Ages."
Royal Inst., 4. Mr. C. T. Newton, "On Ancient Art."
- WED. ...**Geological, 8.
Royal Soc. of Literature, 8½.
Society of Arts. *Conversazione* at the South Kensington Museum.
- THURS. ...**Royal, 8½.
Antiquaries, 8½.
Philological, 8.
Royal Society Club, 6.
Royal Inst., 3. Dr. Lyon Playfair, "On the Progress of Chemical Arts, 1851-62."

- FRI.**Astronomical, 8.
Royal Inst., 8. Mr. W. Fairbairn, F.R.S., "Resisting Properties of Iron."
Royal United Service Inst., 3. General Van den Burgh, "A description of a New Field Gun for projecting a Group or Cluster of Shot, with a brief consideration of its value as a Military Weapon."
- SAT.**Royal Botanic, 3.
Royal Inst., 3. Prof. Anderson, M.D., "On Agricultural Chemistry."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, April 25th, 1862.]

- Dated 14th January, 1862.*
107. S. W. Marsh, Washington, U.S.—Imp. in breech-loading firearms.
- Dated 21st March, 1862.*
782. D. E. Siebe, Mason-street, Lambeth—Imp. in machinery or apparatus for refrigerating or producing cold, part of which imp. are applicable also to other purposes.
784. W. J. Curtis, 13, Tufnell-park-road, Holloway—An apparatus to ascertain and point out the fares and earnings or receipts of public vehicles and their conductors.
- Dated 31st March, 1862.*
899. L. B. Schmolle, Upper John-street, Golden-square—Imp. in the construction of crinolines or steel skirts.
- Dated 2nd April, 1862.*
923. G. Holcroft, Manchester—Imp. in the construction of blast furnaces.
935. W. Leopard, Hurstpierpoint, Sussex—Imp. in railway brake apparatus.
- Dated 3rd April, 1862.*
937. G. Rebour, 15, Passage des Petites Ecuries, Paris—A permanent autographic log, serving to measure, and, if needed, to retrace graphically the swiftness and sailing of a ship, the rapidity of streams, and the propelling of rising and ebbing tides.
941. J. Newton, 5, Montpellier-road, Rye-lane, Peckham—Imp. in the construction of breakwaters, piers, and sea walls.
943. R. M. Toogood and J. Laybourne, Newport—"The Isca Foundry Company," for the invention of "an improvement in railway crossings."
945. M. Amos, Westbury-on-Trym, Gloucestershire—Imp. in harrows.
949. W. A. Richards, Chester-cottage, Cornwall-place, Holloway—Imp. in the manufacture of bags, and in fastenings and locks for bags, parts of the invention being also applicable to purses, cigar cases, reticules, and other similar articles.
- Dated 4th April, 1862.*
951. J. F. Woodall, 28, Orchard-street, Portman-square—Imp. in ventilating carriages for common roads.
953. F. Spencer, Pendleton, Lancashire—Certain imps. in looms for weaving.
954. W. Ryder, Bolton-le-Moors—Imp. in the construction of machines for forging metals.
955. F. C. Bakewell, 6, Haverstock-terrace, Hampstead—Imp. in letter printing machines. (A com.)
957. L. Lindley and F. Taylor, Melbourne-street, Mansfield-road, and Comyn-street, Nottingham—Imp. in sewing and embroiderying machines.
959. G. Moulton, Manchester—Imp. in pentagraph machines used for tracing or engraving rollers or cylinders employed in printing calicoes and other surfaces.
961. A. J. Hale, William-street, Margaret-street, Clerkenwell—Imp. in instruments for drawing ovals.
963. S. Fielding, S. Fielding, jun., R. Fielding, and T. Fielding, Smallbridge, near Rochdale—Imp. in valves and in apparatus for lubricating the same and other parts of steam engines.
965. J. Sceales, Lloyd's—Imp. in steering ships.
966. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of iron and steel. (A com.)
967. W. E. Newton, 66, Chancery-lane—Imp. in pumps for ships' use and other purposes. (A com.)
969. J. Nock and W. K. Price, Birmingham—An imp. or imps. in gas cooking ranges.
- Dated 5th April, 1862.*
973. H. J. Simlick, Baker's Arms-gardens, Wellington-row, Bethnal-green—Imp. in the manufacture of vesuvians or cigar lights.
975. A. Clark, Gate-street, Lincoln's-inn-fields—Imp. in the manufacture of revolving window shutters and blinds, in window sash bars and plates, also in apparatus used in such manufactures.
976. L. Faconnet, 52, Rue du Transit Vaugirard, Paris—A new kind of tiles.
977. R. A. Kobitzsch, Bucharest, in Wallachia—Imp. in diving apparatus, and apparatus to be used for working in deep water.

Dated 7th April, 1862.

981. T. Smith, Salford—Imp. in machinery for cutting and shaping screw bolts and other articles.
 983. A. Harris, Birmingham—An imp. or imps. in the manufacture of gun barrels.
 986. W. N. Nicholson, Newark, Nottinghamshire—Imp. in ranges and stoves.
 987. T. Jackson, Orchard-street, Portman-square—Imp. in pianofortes.

Dated 8th April, 1862.

991. J. Brown, Aldgate—Imp. in protecting the bottoms and sides of ships and other entirely or partially submerged surfaces.
 995. The Hon. W. E. Fitzmaurice, 12, Hyde-park Gate—An improved construction of plating for ships, batteries, and other structures used for war or other purposes.
 997. F. W. Brearey, 53, Cornhill—Imp. in medicated cups or vessels for drinking purposes.
 1003. J. Lawson, Foundry, Leeds—Imp. in balling cotton and thread. (A com.)
 1005. T. Cobley and J. Wright, 42, Bridge-street, Blackfriars—Imp. in the method of, and the apparatus for, treating auriferous and argentiferous minerals and ores for the purpose of extracting and separating the gold and silver from the other metals, minerals, and substances combined therewith, also in the method of treating the various residues resulting therefrom, and in the utilization, application, and use of the said residues when so treated.

Dated 9th April, 1862.

1007. J. E. H. Andrew, Audenshaw, Lancashire—Imp. in looms for weaving.
 1009. G. Hollinshed, Salford, near Manchester—Imp. in sandwich cases and similar articles.
 1011. W. Taylor, Oldham—Certain imp. in machinery or apparatus for preparing and spinning cotton or other fibrous materials.
 1015. C. Mather, Willow Bank, Brompton, near Manchester—Imp. in spittoons.
 1017. W. E. Newton, 66, Chancery-lane—An improved apparatus for raising and forcing water and other liquids (A com.)
 1019. R. Theyson, Hanover—Imp. in cork cutting machinery.

Dated 10th April, 1862.

1020. E. Funnell, 54, East-street, Brighton—An improved self-acting indicator signal for railways.
 1025. A. Black, Banbridge, Ireland—Imp. in swing bridges adapted for crossing lines of railways and other ways.
 1027. Captain C. P. Coles, Southsea, R.N.—Imp. in masts for ships.
 1029. L. Christoph, Paris, W. Hawksworth, Linlithgow, N.B., and P. Harding, Paris—Imp. in drawing metals, and in the machinery or apparatus employed therein.
 1031. J. Platt, Oldham, and W. Richardson and W. Holland, Salford—Imp. in carding engines.
 1033. G. Burge, Albert-road, Regent's-park—An improved means of protecting forts, ships, and other structures and places against projectiles and other striking bodies.
 1035. O. Reynolds, Debach, near Woodbridge, Suffolk—Imp. in building ships and other vessels.
 1037. W. Fox, Amiens, France—Imp. in the manufacture of brooms and brushes.

Dated 11th April, 1862.

1039. H. Holland, Birmingham—Imp. in manufacturing the stretcher joints of umbrellas and parasols.
 1040. J. T. Grice, Birmingham—Imp. in the manufacture of twisted metallic tubes.
 1042. J. Garnett, Windermere, Westmoreland—Imp. in apparatus for washing photographic pictures.
 1044. J. F. Mathias, 22, Rue de Chalon, Paris—An apparatus for pressing and ironing straw hats of any shape or form.
 1045. F. Rigolot, 15, Passage des Petites Ecuries, Paris—Imp. in machinery or apparatus for manufacturing riveting pegs for boots and shoes and other pins or pegs.
 1046. J. M. Landmann, Ste. Croix—Imp. in hydraulic engines.
 1047. T. K. J. Houghton, W. Knowles, and W. Houghton, Gomersal, Yorkshire—Imp. in looms for weaving.
 1048. E. Butterworth, Calder-cottage, near Rochdale—Imp. in machinery for applying adhesive substances to preserve the form of cops of yarn.

1049. W. Clark, 53, Chancery-lane—Imp. in the manufacture of leathern accoutrements. (A com.)
 1050. W. Bush, Tower-hill—Imp. in the construction of ships and shields.
 1053. I. Whitesmith, Glasgow—Imp. in power looms, and in pirn winding apparatus.

Dated 12th April, 1862.

1055. N. Nussey, Holbeck, near Leeds—Imp. in machinery or apparatus for preparing and combing wool, flax, hair, cotton, silk, and other fibrous materials.
 1056. E. Bollee, Le Mans, France—A new hydraulic ram.
 1057. A. Sweet, Hampstead-road—Certain imp. in locks and latches.
 1058. E. Drewett, Blackheath—Imp. in bottles and other vessels whereby to separate and retain sediment from their contents.
 1059. A. S. Campbell, Hampstead—Imp. in surface condensers.
 1060. A. S. Campbell, Hampstead—Imp. in the refrigeration of liquids.

Dated 14th April, 1862.

1061. J. Park, Bury—Certain imp. in or applicable to steam engines.
 1062. E. Peyton and W. F. Baths, Birmingham—Imp. in angle iron, applicable to metallic bedsteads, roofs, bridges, and other similar purposes.

PATENTS SEALED.

[From Gazette, April 25th, 1862.]

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| <i>April 25th.</i> | 2744. R. Mushet. |
| 2691. W. Taylor. | 2761. G. Evans. |
| 2693. G. Hutton. | 2804. H. Montucci. |
| 2702. J. Watt and T. S. Hav- | 2824. W. Clark. |
| side. | 2837. G. Davies. |
| 2708. W. H. Furlonge. | 2850. W. Clark. |
| 2711. J. Eaglesfield. | 2949. E. A. Rouviere. |
| 2712. J. S. Jackson. | 2973. G. Bottomley. |
| 2714. J. Hayward. | 2996. S. Amphlet. |
| 2716. J. H. Johnson. | 3001. S. A. Carpenter. |
| 2735. G. Holcroft. | 3015. E. Tyer. |

[From Gazette, April 29th, 1862.]

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| <i>April 29th.</i> | 2792. J. Walmsley. |
| 2726. E. de Bassano and A. Bau- | 2830. J. J. Shedlock. |
| denne. | 2862. A. E. Carter and T. Hack. |
| 2742. J. Higgins and T. S. Whit- | 2869. M. Wigzell. |
| worth. | 2870. R. Heath. |
| 2752. J. S. Brooks. | 2884. M. Gibson. |
| 2753. A. F. Yarrow and J. B. | 2972. C. Stevens. |
| Hilditch. | 3078. C. F. Varley. |
| 2754. J. C. Wilson. | 3270. W. E. Newton. |
| 2757. J. French. | 99. J. G. Marshall. |
| 2759. S. Osborne. | 111. J. G. Marshall. |
| 2763. T. Spencer & T. Robinson. | 205. S. A. Carpenter. |
| 2770. W. T. Weston. | 225. G. J. N. de Ridder |
| 2772. R. Wilson. | 275. F. W. Daehne. |
| 2776. C. F. Hayes. | 302. E. F. Smith & T. Swinnerton. |
| 2778. R. A. Brooman. | 357. J. H. Johnson. |
| 2788. W. Ramsell. | 396. S. B. Whithield. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, April 29th, 1862.]

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| <i>April 22nd.</i> | 1065. C. Randolph and J. Elder. |
| 1052. J. Marshall, jun. | <i>April 26th.</i> |
| <i>April 23rd.</i> | 1062. Sir T. T. Grant. |
| 1040. W. Warne, J. A. Fanshawe, | 1074. A. Boyle. |
| J. A. Jaques, and T. | 1082. W. Winstanley & J. Kelly. |
| Galpin. | 1120. J. G. Willans. |
| <i>April 25th.</i> | |
| 1051. J. H. Johnson. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, April 29th, 1862.]

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| <i>April 24th.</i> | <i>April 25th.</i> |
| 921. L. A. Avisse. | 979. W. Banks, H. Hampson, |
| | and J. Banks. |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4465	April 15.	{ The Prize self-acting Ventilator, de- signed for the introduction of Pure Air, without sensible draught ... }	H. Francis Bamfylde Mac- namara, C.E. ...	Colchester.
4466	" 17.	Miniature Billiard Table and Stand ...	Richard Stevens ...	29 and 30, Hungerford-market, W.C.
4467	" 22.	Instantaneous Photographic Shutter ...	Wm. White Rouch ...	180, Strand, W.C.
4468	" 24.	Egg Frame with Warner ...	Wm. Spurrier ...	Birmingham.
4469	" 25.	{ Safety Screw Guard for Brooches, Pins, Ear-rings, &c. ... }	Alfred John Marriott ...	237, Oxford-street, W.
4470	" "	Harmoon Corset ...	Aaron Solomons ...	Old Change, E.C.
4471	" 26.	{ The New Registered Exhibition Cigar Holder ... }	John Melchior Hagenbuck ...	{ Honey-lane-market, E.C., and 3, Ca } roline-terrace, Dalston, N.E.
4472	" 30.	Pillar Foot Lathe ...	Thos. H. Small & John Small ...	Great Marlborough-street, W.
4473	" "	Anti-crib Biting Muzzle for Horses ...	Robt. Cuff & Christopher Cuff ...	18, Cockspur-street, S.W.

Journal of the Society of Arts.

FRIDAY, MAY 9, 1862.

CONVERSAZIONI.

The first Conversazione of the present season took place on Wednesday Evening last, the 7th inst., at the South Kensington Museum. There were about 3,000 persons present, including some of Her Majesty's Commissioners for the Exhibition of 1862, Foreign Commissioners, Jurors, Exhibitors, and others connected with the Exhibition.

The bands of the First Life Guards and of the Coldstream Guards were in attendance.

Two other Conversazioni will be held at the South Kensington Museum, on the 9th July and the 8th October.

INTERNATIONAL EXHIBITION OF 1862.

SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £451,100, have been attached to the Deed.

INTERNATIONAL EXHIBITION OF 1862.

LIST OF JURORS IN CLASSES AND SECTIONS.

CLASS I.—MINING, QUARRYING, METALLURGY, AND MINERAL PRODUCTS.

1. Samuel Blackwell, F.G.S., Dudley, Mining Engineer; 2. J. A. C. das Neves Cabral, Portugal, Inspector of Mines; 3. Charles Combes, France, Member of the Institute, Inspector-General, and Director of the School of Mines; 4. Devaux, Belgium, Member of the Department of Science of the Royal Academy of Belgium, Inspector-General of Mines; 5. Lieut.-General Alex. Gerngross, Russia, Director of Mining Department; 6. Sir W. Logan, Canada, Director of the Geological Survey of Canada; 7. Francisco Luxan, Spain, Senator; 8. Sir Roderick Murchison, F.R.S., F.G.S., *Chairman*, London, Director-General of the Geological Survey and of the Government School of Mines, 16, Belgrave-square, S.W.; 9. C. Overweg, Zollverein, Landowner, Letmathe; 10.

J. Percy, M.D., F.R.S., F.G.S., London, Professor of Metallurgy to the Government School of Mines, 2, Craven-hill, W.; 11. Arcangelo Scacchi, Italy, Senator; Professor of Mineralogy; 12. Warrington W. Smyth, M.A., F.R.S., F.G.S., London, Professor of Mining to the Government School of Mines, 27, Victoria-street, S.W.; 13. Thomas Sopwith, F.R.S., F.G.S., Newcastle, Mining Engineer, 43, Cleveland-square, W.; 14. K. Styffe, Sweden, Director of the Royal Polytechnic Institution, Stockholm; 15. Peter Tunner, Austria, Director of the Imperial Mining School in Leoben; 16. H. Hussey Vivian, M.P., F.G.S., Swansea, Mine Owner, 5, Upper Belgrave-street, S.W.; 17. Nicholas Wood, F.G.S., Newcastle, Mining Engineer.

CLASS II.—CHEMICAL SUBSTANCES AND PRODUCTS AND PHARMACEUTICAL PROCESSES.

SECTION A.—*Chemical Products.*

1. Frederick Anthon, Chem. D., Austria, Professor of Chemistry, Prague; 2. Balard, *Chairman*, France, Professor of the College of France and of the Faculty of Science; 3. E. H. von Baumhauer, M.D., Netherlands, Professor of Chemistry in the University of Amsterdam, and Member of the Academy, 56, Brompton-crescent, S.W.; 4. A. Bernays, Ph. D., India, Professor of Chemistry, St. Thomas's Hospital; 5. Chandelon, Belgium, Professor of Chemistry, University of Liège; Member of the Royal Academy of Medicine; 6. E. Frankland, Ph. D., F.R.S., Foreign Secretary to the Chemical Society, 42, Park-road, St. John's-park, Haverstock-hill, N.W.; 7. Professor G. Forchhammer, Denmark, Secretary to the Royal Society of Science, Copenhagen; 8. Wm. Gossage, Warrington, Chemical Manufacturer, 2, Oxford-court, Cannon-street, E.C.; 9. T. Graham, F.R.S., London, Master of the Mint, Vice-President of the Chemical Society, 4, Gordon-square, W.C.; 10. A. W. Hofmann, London, F.R.S., Ph. D., President of the Chemical Society; Professor of Chemistry, Government School of Mines, 9, Fitzroy-square, W.; 11. N. Kunheim, Ph. D., Zollverein, Manufacturer, Berlin; 12. A. V. Lourenço, Portugal, Professor of Chemistry at the Polytechnic of Lisbon; 13. Dr. A. Müller, Sweden, Professor of Chemistry at the Royal Agricultural Academy, Stockholm; 14. Raffaele Piria, Italy, Member of the Italian Parliament; late Minister of Public Instruction, Naples; Professor of Chemistry; 15. James Young, F.R.S.E., F.C.S., Edinburgh, Chemical Manufacturer, 25, South-street, Thurlow-square.

SECTION B.—*Medical and Pharmaceutical Products and Processes.*

1. Dr. Wurtz, France, Professor of the Faculty of Medicine; 2. Von Fehling, M.D., Zollverein, Professor of Chemistry at Stuttgart; 3. Daniel Hanbury, F.L.S., London, Pharmaceutical Chemist, 1, Plough-court, Lombard-street, E.C.; 4. Salvatore de Luca, Italy, Professor of Chemistry; 5. T. N. R. Morson, F.L.S., London, Pharmaceutical Chemist, 38, Queen's-square, Bloomsbury, W.C.; 6. J. M. Neligan, M.D., Dublin, Great Western Hotel, W.; 7. Theos. Redwood, M.D., London, Secretary to the Chemical Society and Professor of Pharmacy to the Pharmaceutical Society, 19, Montague-street, Russell-square, W.C.; 8. A. Schroetter, Ph. D., Austria, General Secretary of the Imperial Academy of Science; Professor of Chemistry, Vienna; 9. Robert Warrington, F.C.S., London, Vice-President of the Chemical Society, Apothecaries-hall, E.C.

CLASS III.—SUBSTANCES USED FOR FOOD.

SECTION A.—*Agricultural Produce.*

1. Constantine Ardanaz, Spain; 2. James Buckman, Cirencester, Professor at the Royal Agricultural College, Cirencester, 22, Sussex-place, Regent's-park, N.W.; 3. Buffet, France, late Minister; 4. J. D'Andrade Corvo, Portugal, Professor at the Agricultural Institute, and at

the Polytechnic at Lisbon, Member of the Academy of Science; 5. Elsner Von Gronow, Zollverein, Member of the Royal Board of Agriculture, Kalinowitz; 6. C. Wren Hoskyns, London, Member of the Council of the Royal Agricultural Society, 27, Berkeley-square, W.; 7. Stefano Jacini, Italy, Member of the Italian Parliament, late Minister of Public Works; 8. Jacquemyns, Belgium, Member of the Chamber of Representatives and of the Chamber of Commerce at Ghent; 9. J. W. Larking, Turkey, The Firs, Lee, Kent, S.E.; 10. Chas. Lawson, Edinburgh, Seedsman, 43, Glo'ster-place, Hyde-park, W.; 11. P. Möller, Sweden; 12. Lord Portman, London, President of the Royal Agricultural Society of England, 5, Princes-gate, W.; 13. M. E. Rodocanachi, Greece, Merchant, 3, Gloucester-square, Hyde-park, W.; 14. Nicholas-Tchernayev, Russia, Member of the Scientific Committee of Crown Lands, 58, Brompton-square, S.W.; 15. E. W. Thomson, Canada, President of the Board of Agriculture; 16. Ch. Woolton, London, Hop Merchant, 246, High-street, Borough, S.E.; 17. Count H. de Zichy, Austria, Land and Mine Owner.

SECTION B.—Dysaltery, Grocery, and Preparations of Food as sold for Consumption.

1. Boussingault, *Chairman*, France, Member of the Institute, Professor to the Conservatory of Arts and Manufactures; 2. A. Campbell, M.D., India, Superintendent at Darjeeling, Great Western Hotel, W.; 3. James Carey, S. American Republics, Colonial Broker, 36, Mincing-lane, E.C.; 4. E. T. Foord, Ionian Islands, Merchant, 6, Crosby-square, E.C.; 5. F. Hicks, London, Sugar Refiner, 11, Little Alie-street, E.; 6. Jacob, Zollverein, Councillor of Commerce, Halle on Saale; 7. Henry L. Keeling, London, Fruit and Grocery Warehouseman, 3, Monument-yard, E.C.; 8. E. Lankester, M.D., F.R.S., London, Superintendent of Food Collection, South Kensington, 8 Savile-row, W.; 9. H. Letheby, M.B., F.L.S., London, Officer of Health of City of London, 41, Finsbury-square, E.C.; 10. S. Mavrojani, Greece, 26, Gloucester-square, Hyde-park, W.; 11. Baron Riese Stalburg, Austria, Member of Austrian Parliament, Landowner; 12. Adolfo Targioni Tozzetti, Italy, Professor of Zoology, Royal Museum of Natural History, Florence; 13. C. Woodhouse, Mauritius, Colonial Broker, Mincing-lane, E.C.

SECTION C.—Wines, Spirits, Beer, and other Drinks, and Tobacco.

1. J. S. Bowerbank, F.R.S., London, Distiller, 3, High-bury-grove, N.; 2. Ch. Buxton, M.P., London, Brewer, 7, Grosvenor-crescent, S.W.; 3. Gordon W. Clark, London, Wine Broker, 72, Great Tower-street, E.C.; 4. J. A. Van Eyck, Ph. D., Netherlands, Director of the Palace of Industry in Amsterdam; 5. E. C. Ionides, Greece, Merchant, 51, Inverness-terrace, W.; 6. D. Leiden, Zollverein, Councillor of Commerce, Cologne, Westminster Palace Hotel, S.W.; 7. Monny de Mornay, France, Director of Agriculture in the Ministry of Agriculture, Commerce, and Public Works; 8. Noetzel-Langmesser, Switzerland, Wine Merchant, Basel; 9. A. H. Novelli, London, 6, Grosvenor-street, W.; 10. A. Odelberg, Sweden; 11. Arthur Otway, Ionian Islands, Army and Navy Club, George-street, Pall-mall, S.W.; 12. George Phillips, London, Principal of Laboratory to the Excise Office, Somerset-house, W.C.; 13. Jos. Prestwich, F.R.S., London, Wine Merchant, 10, Kent-street, Regent's-park, N.W.; 14. Marquis-Gen. Emilio Bertone di Sambuy, Italy; 15. Robert Schlumberger, Austria, Member of the Chamber of Commerce, Vienna.

CLASS IV.—ANIMAL AND VEGETABLE SUBSTANCES USED IN MANUFACTURES.

SECTION A.—Oils, Fats, and Wax, and their Products.

1. J. Ben Heath, Italy, Italian Consul General; 2. P. J. Kerekhoff, M.D., Netherlands, Professor of Chemistry in the University of Groningen; 3. S. Marcoran, Ionian

Islands; 4. Emmanuel Mavrogordato, Greece, Merchant, 56, Westbourne-terrace; 5. T. J. Miller, M.P., London, Spermaceti Manufacturer, Dorset Wharf, Millbank, S.W.; 6. W. A. Miller, F.R.S., London, Professor of Chemistry, King's College, London, King's College, W.C.; 7. A. Payen, France, Member of the Institute, Professor to the Conservatory of Arts and Manufactures, and Professor to the Central School of Arts and Manufactures; 8. Emil Seybel, Austria, Member of the Chamber of Commerce, Vienna; 9. Stas, Belgium, Member of the Department of Science of the Royal Academy of Belgium; 10. Dr. Stein, Zollverein, Professor, Dresden; 11. T. Thompson, M.D., India, Superintendent of the Botanical-gardens, Calcutta, 5, York-gate, Regent's-park, N.W.; 12. W. W. Williams, London, Soapmaker, 31, Westbourne-park, W.; 13. Geo. Wilson, F.R.S., London, Manager of Price's Patent Candle Works, Wandsworth-common, S.

SECTION B.—Other Animal Substances used in Manufacture.

1. Capt. C. Bagot, South Australia, 8, Inverness-terrace, W.; 2. Bella, France, Director of the Agricultural Institution of Grignon; 3. Samuel Birchall, New South Wales, Wool Merchant, Gresham Club, E.C.; 4. George Busk, F.R.S., London, Secretary of the Linnean Society, 15, Harley-street, W.; 5. Robert Czilchert, Austria, Landowner; 6. Sir Frederick J. Halliday, K.C.B., India, late Lieut.-Governor of Bengal, 28, Cleveland-square, W.; 7. J. G. Homere, Greece, Merchant, 4, The Terrace, Kensington-gardens-square, W.; 8. J. Jowitt, Queensland, Wool Merchant (James Scott and Co.), 11, King William-street, E.C.; 9. Antonio Marchetti, Italy, Member of the Italian Parliament; 10. J. J. Mechi, London, Alderman, 4, Leadenhall-street, E.C.; 11. P. L. Sclater, F.R.S., London, Secretary of the Zoological Society, 11, Hanover-square, W.; 12. L. Scholler, Zollverein, Privy Councillor of Commerce, Duren; 13. J. Stebut, Russia, Professor of Agriculture in the Agricultural College, Gori-gorsk, 58, Brompton-square, S. W.

SECTION C.—Vegetable Substances used in Manufactures, &c.

1. T. Archer, F.R.S.E., Edinburgh, Director of Industrial Museum, Edinburgh; 2. Barral, France, Member of the Imperial Society of Agriculture; 3. Robert Fauntleroy, London, Hardwood Merchant, 99, Bunhill-row, Finsbury, E.C.; 4. J. D. Hooker, M.D., F.R.S., V.P.L.S., F.G.S., London, Director Royal Botanic Gardens, Royal Gardens, Kew, S.W.; 5. J. B. Hurlbert, LL.D., Canada; Sir Robert Kane, F.R.S., M.R.I.A., Dublin, Director of Museum of Irish Industry; 7. J. Miers, F.R.S., F.L.S., Brazil, Temple-lodge, Hammernsmith, W.; 8. Filippo Parlatore, Italy, Professor of Botany, Royal Museum of Natural History, Florence; 9. W. Henry Peat, South American Republics, 11, Mincing-lane, E.C.; 10. George Peterson, Russia, Member of the Scientific Committee of Crown Lands, and of the Council of Manufactures, 56, Brompton-square, S.W.; 11. R. Riddell, India, late Superintending Surgeon, Nizam's Army, Deccan, 7, The Grove, Clapham, S.; 12. W. W. Saunders, F.R.S., Tasmania, Vice-President of the Linnean Society; 13. Chev. de Schwarz, Austria, *Chairman*, Imperial Councillor, Director of the Austrian Consulate General, Paris; 6, Onslow-crescent, S.W.; 14. M. A. Sevastopoulo, Greece, Merchant, 18, Leinster-gardens, W.; 15. Dr. Thiel, Zollverein.

SECTION D.—Perfumery.

1. E. Moll, France, Professor at the Conservatory of Arts and Manufactures; 2. W. Odling, M.D., F.R.S., London, Professor of Practical Chemistry, Guy's Hospital, Guy's Hospital, S.E.; 3. Sept. Piesse, London, Distiller of Perfumes, 2, New Bond-street, W.; 4. Eugene Rimmel, London, Perfumer, 96, Strand, W.

CLASS V.—RAILWAY PLANT, INCLUDING LOCOMOTIVES AND CARRIAGES.

1. Wm. Paker, C.E., London, Engineer to London and North-Western Railway Company, 63, Gloucester-place,

Hyde-park, W.; 2. G. P. Bidder, C.E., London, late President of the Institution of Civil Engineers, 24, Great George-street, Westminster, S.W.; 3. Flachet, France, Consulting Railway Engineer; 4. James Kitson, Leeds, Mayor of Leeds, Manufacturer of Locomotive Engines; 5. Kruger, Zollverein, Director of Royal Machine Factories, Dirscham; 6. J. F. McConnell, Wolverton, late Locomotive Superintendent of the London and North-western Railway Company; 7. F. Spitaels, Belgium; 8. Arch. Sturrock, Doncaster, Locomotive Engineer, Great Northern Railway, G. N. Railway, King's-cross, N.; 9. Duke of Sutherland, *Chairman*, London, Stafford House, S.W.; 10. Col. Yolland, R.E., F.R.S., London, Inspector of Railways, 17, Westbourne-park, W.

CLASS VI.—CARRIAGES NOT CONNECTED WITH RAIL OR TRAM ROADS.

1. Jos. Holland, London, Carriage Builder, 254, Oxford-street, W.; 2. H. M. Holmes, Derby, Coach Builder, 38, Margaret-street, Cavendish-square, W.; 3. George Hooper, London, Coach Builder, 28, Haymarket, W.; 4. Genl. Morin, *Chairman*, France, Member of the Institute, Director of the Conservatory of Arts and Manufactures; 5. J. N. Peters, London, Coach Builder, 96, Park-street, Grosvenor-square, W.; 6. Viscount Torrington, London, 4, Warwick-square, S.W.

CLASS VII.—MANUFACTURING MACHINES AND TOOLS.

SECTION A.—Machinery employed in Spinning and Weaving.

1. Boettcher, Zollverein, Professor at the Industrial School, Chemnitz; 2. Callon, France, Chief Engineer to the Imperial Corps of Mines; 3. J. Cheetham, Staley-bridge, Cotton Spinner, Reform Club, Pall-mall, S.W.; 4. M. Curtis, Manchester, Machine Maker; 5. Ben. Fothergill, London, Consulting Engineer, 65, Cannon-street, E.C.; 6. Kindt, Belgium, Inspector of Industry for the Minister of the Interior; 7. J. G. Marshall, Leeds, Flax Spinner.

SECTION B.—Machines and Tools employed in the Manufacture of Wood and Metal.

1. J. Anderson, Woolwich, Assistant-Superintendent Gun Factories, Royal Arsenal, Woolwich; 2. W. Fairbairn, F.R.S., *Chairman*, Manchester, Engineer; 3. Robt. Mallet, F.R.S., London, Vice-President of the Irish Institution of Civil Engineers, 11, Bridge-street, Westminster, S.W.; 4. Rev. H. Moseley, M.A., F.R.S., Bristol, Canon of Bristol, Council of Military Education, 13, Great George-street, Westminster, S.W.; 5. Dr. Rühlmann, Zollverein, Professor in Hanover; 6. Séguier, France, Member of the Institute; 7. J. Whitworth, F.R.S., Manchester, Engineer, Fenton's Hotel, St. James's-street, S.W.

CLASS VIII.—MACHINERY IN GENERAL.

1. L. R. Bodmer, Switzerland, Consulting Engineer, 1, Lansdowne-villas, Notting-hill, W.; 2. Chevalier de Burg, Austria, Imperial Councillor, President of the Society of Arts and Manufacturers at Vienna; 3. Earl of Caithness, London, 17, Hill-street, Berkeley-square, W.; 4. M. Chevalier, *Chairman*, France, Senator, Member of the Institute; 5. J. Hawshaw, F.R.S., F.G.S., London, President of the Institution of Civil Engineers, 43, Eaton-place, S.W.; 6. J. Hick, C.E., Bolton, Civil Engineer; 7. J. M. de Ponte Horta, Portugal, Professor of Mathematics at the Polytechnic of Lisbon; 8. W. M. Neilson, C.E., Glasgow, Civil Engineer; 9. John Penn, C.E., London, Mechanical Engineer, Lee, Kent, S.E.; 10. O. Pihl, Norway, Civil Engineer, 29, Upper Berkeley-street, W.; 11. Du Pré, Belgium, Honorary Chief Engineer of Bridges and Roads; 12. W. Macquorn Rankine, Glasgow, Professor of Mechanics in the University of Glasgow; 13. F. B. Taylor, United States, Mechanical Engineer and Designer, 4, South-parade, Chelsea, S.W.; 14. H. Thomas, Zollverein, Manufacturer, Berlin.

CLASS IX.—AGRICULTURAL AND HORTICULTURAL MACHINES AND IMPLEMENTS.

1. C. E. Amos, C.E., London, Consulting Engineer to Royal Agricultural Society, The Grove, Southwark, S.E.; 2. Col. Challoner, London, 11, Charles-street, Berkeley-square, W.; 3. C. J. Dannfelt, Sweden, Inspector, Royal Agricultural Academy; 4. G. Devincenzi, Italy, Member of the Italian Parliament, late Minister of Agriculture, Naples, 44, Thurloe-square, S.W.; 5. E. Egan, Austria, Member of the Imperial Agricultural Society; 6. Viscount Eversley, F.G.S., London, 9, Eaton-place, S.W.; 7. J. Gibson, Dalkeith; 8. B. S. Jørgensen, Denmark, *Chairman* of the Royal Agricultural Society, Denmark; 9. Wellington Lee, United States, Civil Engineer, 17, Norfolk-street, W.C.; 10. Lord Talbot de Malahide, F.R.G.S., Dublin, 81, Jermyn-street, S.W.; 11. Hervé Mangon, France, Engineer to the Imperial Corps of Bridges and Roads, Professor at the School of Bridges and Roads; 12. De Mathelin, Belgium, Member of the Upper Council of Agriculture; 13. J. Miller, Falkirk; 14. J. C. Morton, London, Editor of the *Agricultural Gazette*, 41, Wellington-street, W.C.; 15. Sir Joseph Paxton, M.P., F.L.S., London, Engineer and Architect, 7, Pall-mall East, W.; 16. Marquis de Perales, *Chairman*, Spain; 17. Pintus, Zollverein, Manufacturer, Berlin, 38, Sydney-street, S.W.; 18. Sir John Villiers Shelley, Bart., M.P., London, 1, St. James-place, S.W.

CLASS X.—CIVIL ENGINEERING, ARCHITECTURAL AND BUILDING CONTRIVANCES.

SECTION A.—Civil Engineering and Building Contrivances.

1. Delesse, France, Engineer to the Imperial Corps of Mines, Professor of the Normal School, President of the Geological Society; 2. J. Kelk, London, contractor, Exhibition-building, W.; 3. Koch, Zollverein, Government and Architectural Councillor, Berlin; 4. Leclerc, Belgium, Inspector of Agriculture and Engineer of Bridges and Roads; 5. Maurice Loehr, Austria, Imperial Councillor of the Board of Trade and Public Works; 6. C. Manby, C.E., London, Hon. Sec. to the Institute of the Civil Engineers; 7. Thomas Page, London, Civil Engineer, Middle Scotland-yard, Westminster, S.W.; 8. Sir J. Rennie, F.R.S., F.G.S., London, Civil Engineer, 5A, Spring-gardens, S.W.; 9. Marquis of Salisbury, K.G., *Chairman*, London, 20, Arlington-street, S.W.; 10. Cesare Valerio, Member of the Italian Parliament.

SECTION B.—Sanitary Improvements and Constructions.

1. Neil Arnott, M.D., F.R.S., London, author of Works on Heating and Ventilation, &c., 2, Cumberland-terrace, Regent's park, N.W.; 2. J. W. Bazalgette, C.E., Engineer to Metropolitan Board of Works, Spring-gardens, S.W.; 3. Bommart, France, General Inspector in the Imperial Corps of Bridges and Roads; 4. Sir Joseph Olliffe, London, Physician to British Embassy, Paris; 5. R. Angus Smith, M.D., F.R.S., Manchester, Secretary to the Manchester Literary and Philosophical Society; 6. J. Sutherland, M.D., London, Inspector of Burial-grounds, 41, New Finchley-road, N.W.

SECTION C.—Objects shown for Architectural Beauty.

1. Stavros Dilberoglu, Greece, 13, Barnsbury-park, N.; 2. S. L. Donaldson, Ph. D., London, Professor of Architecture, University College, Bolton-gardens, Russell-square, W.C.; 3. Theo. Jordan, Russia, Member of the Imperial Academy of Fine Arts, 12, Brompton-square, S.W.; 4. A. L. J. Meier, N. Germany, Architect, 26, Gloucester-grove West, Old Brompton, S.W.; 5. Gilbert Scott, R.A., London, Architect, 20, Spring-gardens, S.W.; 6. Syd. Smirke, R.A., London, Architect, 79, Grosvenor-street, W.; 7. W. Tite, M.P., F.R.S., London, President of the Royal Society of British Architects, 42, Lowndes-square, S.W.; 8. E. Trélat, France, Professor to the Conservatory of Arts and Manufactures.

CLASS XI.—MILITARY ENGINEERING, ARMOUR, AND ACCOUTREMENTS, ORDNANCE AND SMALL ARMS.

SECTION A.—*Clothing and Accoutrements.*

1. Major-Gen. Sir Fred. Abbott, C.B., London, 13, Inverness-terrace, W.; 2. Col. Joseph Hudson, London, Superintendent of the Royal Military Clothing Establishment, 13, Victoria-street, Pimlico, W.; 3. Moisez, France, Commissary-General; 4. Viscount Ranelagh, London, Colonel South Middlesex Volunteers, 7, New Burlington-street, W.; 5. Major Russell, Egypt, 62, Moorgate-street, E.C.; 6. General Paolo Solaroli, Italy, Aide-de-camp of his Majesty, &c.

SECTION B.—*Tents, Camp Equipage, and Military Engineering.*

1. Treuille de Beaulieu, France, Colonel of Artillery, Director of the Central Dépôt of Artillery; 2. General Sir J. Burgoyne, Bart., G.C.B., *Chairman*, London, Inspector-General of Fortifications, War Office, Pall-mall, S.W.; 3. Captain Douglas Galton, R.E., F.R.S., London, Assistant Inspector-General of Fortifications, 12, Chester-street, Grosvenor-place, S.W.; 4. Major-Gen. Hon. James Lindsay, M.P., London, 25, Portman-square, W.; 5. Col. Henry Owen, R.E., C.B., Plymouth, Commanding Royal Engineers, Plymouth, 52, Bedford-square, W.C.

SECTION C.—*Arms and Ordnance.*

1. Sir William Armstrong, F.R.S., C.B., London, Superintendent of Royal Gun Factories, Athenæum Club, S.W.; 2. Lieutenant-General Giovanni Cavalli, Italy; 3. General Guidé, France, Commander of the Artillery of the 1st Division; 4. General the Hon. A. Gordon, C.B., F.R.G.S., London, General in Command, Curragh Camp, 7, Argyll-street, W.; 5. Major-General Hay, London, Inspector of Musketry at Hythe, United Service Club, Pall Mall, S.W.; 6. Colonel Messoud Bey, Turkey; 7. Micheels, Belgium, Lieutenant-Colonel of Artillery; Sub-Inspector of the Manufacture of Arms; 8. Nicholas Novitzky, Russia, Colonel of the Russian Imperial Guards, 27, Alfred-place, S.W.; 9. Westley Richards, Birmingham, Rifle-maker, 39, St. James's-place, S.W.; 10. Col. St. George, C.B., R.A., Woolwich, President Ordnance Select Committee, 11, Rutland-gate, S.W.; 11. Lord Vernon, London, 12, Great Marlborough-street, W.; 12. Weyersberg, Zollverein, Manufacturer, Solingen.

CLASS XII.—NAVAL ARCHITECTURE, INCLUDING SHIP'S TACKLE.

SECTION A.—*Ships for Purposes of War and Commerce.*

1. Rear-Admiral Fitzroy, F.R.S., London, Chief of Meteorological Department, Board of Trade, 38, Onslow-square, S.W.; 2. Rear-Admiral P. Lisiansky, Russia, Imperial Russian Navy; 3. Robert Napier, *Chairman*, Glasgow, Iron Ship Builder, 5, Montague-place, W.C.; 4. Paris, France, Rear-Admiral; 5. J. D'A. Samuda, London, Ship Builder, 7, Gloucester-square, Hyde-park, W.; 6. Isaac Watts, C.B., London, Chief Constructor of the Navy, 8, Horsley-place Villas, Paddington, W.

SECTION B.—*Boats, Barges, and Vessels for Amusement.*

1. Right Hon. Milner Gibson, M.P., London, President of the Board of Trade, 3, Hyde-park-place, W.; 2. Sir W. Snow Harris, F.R.S., Plymouth; 3. Perdonnet, France, Superintendent of Railways; Professor to the Central School of Arts and Manufactures; 4. Rear-Admiral Washington, F.R.S., London, Hydrographer to the Admiralty, 7, Oxford-square, Hyde-park, W.

SECTION C.—*Ship's Tackle and Rigging.*

1. Clapeyron, France, Member of the Institute; Engineer-in-Chief to the Imperial Corps of Mines; Professor to the School of Bridges and Roads; 2. H. D. Cunningham, F.R.G.S., Portsmouth, Union Club, Trafalgar-

square, W.C.; 3. W. S. Lindsay, M.P., London, Ship owner, 8, Austin Friars, E.C.; 4. Rear-Admiral R. S. Robinson, London, Controller of the Navy, 61, Eaton-place, S.W.

CLASS XIII.—PHILOSOPHICAL INSTRUMENTS AND PROCESSES DEPENDING ON THEIR USE.

1. Sir David Brewster, K.H., F.R.S., Edinburgh, Principal of Edinburgh University; 2. Charles Brooke, F.R.S., London, Surgeon to Westminster Hospital, 16, Fitzroy-square, W.; 3. Dr. Dove, *Chairman*, Zollverein, Professor of Natural Philosophy and Principal of the Academy of Sciences, Berlin; 4. J. P. Gassiot, F.R.S., London, Wine Merchant, Clapham-common, S.; 5. James Glaisher, F.R.S., London, Superintendent of the Meteorological and Magnetical Department, Greenwich Observatory, 1, Dartmouth-place, Blackheath, S.E.; 6. Colonel Sir H. James, R.E., F.R.S., Southampton, Superintendent of Ordnance Survey; 7. G. Karsten, Denmark, Professor, Kiel; 8. Edouard Kraft, Austria, Member of the Council of Civil Engineers, Vienna; 9. Mathieu, France, Member of the Institute, and of the Bureau of Longitude; Examiner at the Polytechnic; 10. Carlo Matteucci, Italy, Senator; 11. Major-General Sabine, R.A., F.R.S., London, President of the Royal Society, 13, Ashley-place, Westminster, S.W.; 12. Wm. Thomson, F.R.S., I.L.D., Professor of Natural Philosophy, University of Glasgow; 13. C. Wheatstone, F.R.S., London, Professor of Experimental Philosophy, King's College, 7, Chester-terrace, Regent's-park, N.W.

CLASS XIV.—PHOTOGRAPHY AND PHOTOGRAPHIC APPARATUS.

1. H. W. Diamond, M.D., London, Twickenham-house, Twickenham, S.W.; 2. A. F. J. Claudet, F.R.S., London, Photographer, 11, Gloucester-road, Regent's park, N.W.; 3. Baron Gros, *Chairman*, France, Senator; 4. Lord Henry Lennox, M.P., London, 51, Portland-place, W.; 5. C. T. Thompson, London, Official Photographer, Science and Art Department, South Kensington Museum, W.; 6. J. Tyndall, Ph. D., F.R.S., London, Professor of Physics, Royal Institution, Albemarle-street, W.

CLASS XV.—HOROLOGICAL INSTRUMENTS.

1. Dr. Frick, Zollverein, Professor of Physics, Freiburg; 2. Ch. Frodsham, London, Chronometer Maker, 84, Strand, W.C.; 3. Rt. Haswell, London, Watch Tool Maker, 49, Spencer-street, Clerkenwell, E.C.; 4. E. D. Johnson, London, Chronometer Maker, 9, Wilmington-square, W.C.; 5. Laugier, France, Member of the Institute and of the Bureau of Longitudes; 6. Sylvain Mairé, Switzerland, Watchmaker, Lôle; 7. Rear-Admiral Manners, F.R.S.A., 8, Henrietta-street, Cavendish-square, S.W.; 8. Viscount de Villa Maior, *Chairman*, Portugal, Director-General of the Agricultural Institute; Professor of Chemistry at the Polytechnic of Lisbon, and Member of the Academy of Science, 91, Sloane-street, S.W.; 9. Lord Wrottesley, F.R.S., London, late President of the Royal Society, 1, Albemarle-street, W.

CLASS XVI.—MUSICAL INSTRUMENTS.

1. W. Sterndale Bennett, Mus. D., London, Professor of Music, University of Cambridge, 50, Inverness-terrace, W.; 2. J. R. Black, M.D., United States, 23, Sumner-place, S.W.; 3. Th. Böhm, Zollverein, Court Musician, Munich; 4. Right Hon. Sir Geo. Clerk, F.R.S., *Chairman*, Edinburgh, Chairman of Royal Academy of Music, 43, Eaton-square, S.W.; 5. Pétis, Belgium, Member of the Department of Fine Art of the Royal Academy of Belgium, Director of the Royal Conservatory of Music; 6. Lissajous, France, Professor of Physics to the Lyceum of St. Louis; 7. Sir F. Gore Ouseley, Bart., Mus. D., Professor of Music, University of Oxford; 8. Ernst Pauer, Austria, Professor of Music, 3, Cranley-place, S.W.; 9. Wm. Pole, Mus. B., F.R.S., London, Professor of Civil Engineering, University of London, 3, Storey's-gate,

Westminster, S.W.; 10. Earl of Wilton, G.C.H., London, 7, Grosvenor-square, W.; 11. Henry Wyld, Mus. D., London, Professor at the Royal Academy of Music, 6, Burwood place, Hyde-park, W.

CLASS XVII.—SURGICAL INSTRUMENTS.

1. Thos. Bell, F.R.S., London, Vice-President of the Royal Society, Athenæum Club, S.W.; 2. Wm. Bowman, F.R.S., London, Surgeon to King's College Hospital, 5, Clifford-street, W.; 3. Arthur Farre, M.D., F.R.S., London, Physician for Diseases of Women and Children to King's College Hospital, 12, Hertford-street, Mayfair, W.; 4. F. Seymour Haden, F.R.C.S., London, Surgeon, 62, Sloane-street, S.W.; 5. James Luke, F.R.S., London, Consulting Surgeon, London Hospital, 3, Broad-street-buildings, E.C.; 6. Nélaton, France, Professor to the Faculty of Medicine; 7. James Syme, F.R.S.E., Edinburgh, *Chairman*, Professor of Clinical Surgery, University of Edinburgh.

CLASS XVII.—COTTON.

1. Henry Ashworth, Bolton, President of the Manchester Chamber of Commerce, Fenton's Hotel, St. James's-street, S.W.; 2. Thos. Bazley, M.P., *Chairman*, Manchester, Calico Printer, 3A, King-street, St. James's, S.W.; 3. Sir James Campbell, Glasgow, Warehouseman; 4. Dolfus, France, Manufacturer; 5. Max. Dormitzer, Austria, President of the Chamber of Commerce, Prague; 6. Duhayon-Brunfaut, Belgium, Manufacturer and Judge of the Chamber of Commerce at Brussels; 7. E. Knapp, Zollverein, Manufacturer, Betzingen; 8. J. Murray, Manchester, Cotton Spinner, 16, Bryanstone-square, W.; 9. E. Loria, Egypt, Merchant, 32, Pelham-street, S.W.; 10. Wetter-Müller, Switzerland, Banker, St. Gall; 11. Alex. Scherer, Russia, Member of the Council of Manufactures; 12. Giovanni Vonwiller, Italy.

CLASS XIX.—FLAX AND HEMP.

1. M. Alcan, France, Professor at the Conservatory of Arts and Manufactures, 32, Ovington-square, S.W.; 2. Erskine Beveridge, Dunfermline, Flax Manufacturer, 15, Langham-street, Portland-place, W.; 3. Marquis Luigi Cusani, Italy; 4. Wm. Charley, Belfast, Linen Merchant; 5. Ch. de Brouckere, Belgium, President of the Chamber of Commerce at Roulers, Member of the Upper Council of Industry; 6. G. Mevissen, *Chairman*, Zollverein, Privy Councillor of Commerce, Cologne, Westminster Palace Hotel, S.W.; 7. J. Moir, Dundee, Flax Spinner; 8. C. Oberleithner, Austria, Manufacturer; 9. Hon. Fred. Smyth, United States, formerly Member of the Senate of New Hampshire.

CLASS XX.—SILK AND VELVET.

1. Henry Brocklehurst, Macclesfield Velvet Manufacturer, 31, Milk-street, Cheapside, E.C.; 2. Charles Diggelmann, Switzerland, Silk Warehouseman; 3. Arles-Dufour, *Chairman*, France, Member of the Chamber of Commerce at Lyons; 4. H. W. Freeland, M.P., Turkey, Athenæum Club, S.W.; 5. Anton Harpke, Austria, Member of the Chamber of Commerce at Vienna; 6. W. S. Leaf, London, Silk Warehouseman, 39, Old Change, E.C.; 7. S. W. Lewis, London, Silk Mercer, 193, Regent-street, W.; 8. Jose Reig, Spain; 9. Filippo Sessa, Italy, Manufacturer, Westminster Palace Hotel, S.W.; 10. Baron Von Diergardt, Zollverein, Privy Councillor of Commerce, Vierssen; 11. Thomas Winkworth, London, late Silk Manufacturer, 7, Sussex-place, Canonbury, N.

CLASS XXI.—WOOLLEN AND WORSTED, INCLUDING MIXED FABRICS GENERALLY.

1. R. Atkinson, Dublin, late Lord Mayor of Dublin, Poplin Manufacturer, 1, Cambridge-place, Victoria-road, W.; 2. Alex. Boutovsky, Russia, Director of the Department of Manufactures and Inland Trade; 3. Wm. Clabburn, Norwich, Shawl Manufacturer; 4. H. Hudson,

Leeds, Woollen Merchant, 7, Harley-street, Cavendish-square; 5. E. Huth, Huddersfield, Foreign Merchant; 6. Larssonier, France, manufacturer, Member of Chamber of Commerce of Paris; 7. Laoureux, Belgium, Member of the Senate; 8. F. Marbach, Saxony, Manufacturer, Chemnitz; 9. Chs. Offermann, *Chairman*, Austria, Manufacturer, at Brünn, 24, Charles-street, St. James's-square; 10. C. Palmstedt, Sweden, Professor; 11. E. Prætorius, Prussia, Councillor of Commerce, Berlin; 12. J. W. Redhouse, F.R.A.S., Turkey, 18, Garway-road, Bayswater, W.; 13. H. W. Ripley, Bradford, Chairman of the Bradford Chamber of Commerce, 9, St. George's-terrace, Hyde-park; 14. Gregorio Sella, Italy; 15. E. E. Vreede, Netherlands, Woollen Manufacturer; 16. H. S. Way, London, Woollen Warehouseman, 127, Cheapside, E.C.

CLASS XXII.—CARPETS.

1. Badin, France, Director of Imperial Manufactures at Gobelin and Beauvais, 3, George-street, Portman-square; 2. J. Brinton, Kidderminster, Carpet Manufacturer, 90, Newgate-street, E.C.; 3. P. Graham, London, Upholsterer, 33, Oxford-street, W.; 4. H. L. Lapworth, London, Carpet Manufacturer, 22, Old Bond-street, W.; 5. Sylvain van de Weyer, *Chairman*, Belgium, Envoy Extraordinary and Minister Plenipotentiary, 50, Portland-place, W.; 6. W. Whitwell, Kendal, Carpet Manufacturer, 26, Gloucester-place, Dorset-square, N.W.

CLASS XXIII.—WOVEN, SPUN, FELTED, AND LAID FABRICS, WHEN SHOWN AS SPECIMENS OF PRINTING AND DYEING.

1. Pompejus Bolley, Ph.D., *Chairman*, Switzerland, Professor of Chemistry at Zurich; 2. Crace Calvert, F.R.S., Ph.D., Manchester, Honorary Professor of Chemistry to the Manchester Royal Institution; 3. R. Dalglish, M.P., Glasgow, Calico Printer, 2, Queen's-gate-terrace, W. 4. Alexander Harvey, Glasgow, Dyer; 5. F. Leitenberger, Austria, Manufacturer; 6. J. Mercer, F.R.S., F.C.S., Accrington, Calico Printer; 7. A. Neild, Manchester, Calico Printer; 8. Persoz, France, Professor at the Conservatory of Arts and Manufactures; 9. M. Reichenheim, Zollverein, Manufacturer, Berlin; 10. J. S. Stern, Manchester, Merchant, Fenton's Hotel, St. James's-street, S.W.

CLASS XXIV.—TAPESTRY, LACE, AND EMBROIDERY.

1. Aubry, France, Merchant, late member of the Tribunal of Commerce; 2. Dan. Biddle, London, Lace Manufacturer, 68, Finchley New-road, Hampstead, N.W.; 3. Richard Birkin, Nottingham, Lace Manufacturer; 4. J. Fisher, London, late Lace Manufacturer, 60, St. James's-street, S.W.; 5. F. Fortamps, *Chairman*, Belgium, Member of the Senate, 27, Ovington-square, S.W.; 6. Rudolph Laporta, Austria, Manufacturer; 7. Prince St. Giuseppe of Pandolfina, Italy, Senator; 8. Major-Gen. Sir H. Rawlinson, K.C.B., F.R.S., Turkey, 1, Hill-street, Berkeley-square, W.; 9. Richter, Zollverein, Inspector of Industrial Schools, Schneeberg; 20. E. Stadler, Switzerland, Commission Merchant, 2, Lawrence-lane, E.C.; 11. Col. Sykes, M.P., F.R.S., India, Chairman of the East India Company, 47, Albion-street, Hyde-park, W.

CLASS XXV.—FURS, FEATHERS, AND HAIR.

SECTION A.—Skins and Furs.

1. Duke of Casigliano, Italy; 2. E. Ellice, M.P., London, Deputy Governor of the Hudson's Bay Company, 18, Arlington-street, S.W.; 3. Gabl. Kamensky, *Chairman*, Russia, Russian Commissioner in London, 33, Victoria-road, Kensington-gore, W.; 4. J. A. Nicholas, London, Furrier, 82, Oxford-street, W.; 5. Guillme. Petit, France, Manufacturer; 6. E. B. Roberts, London, Furrier to the Hudson's Bay Company, 239, Regent-street, W.

SECTION B.—Feathers and Manufactures from Hair.

1. Augustus Altgelt, Zollverein, Government and Ar-

chitectural Councillor, Berlin; 2. Chas. Duncum, London, Artificial Florist, 16, Wigmore-street, W.; Henri Gillett, France, Manufacturer, President of the Chamber of Commerce of Bar-le-Duc; 4. G. B. Kent, London, Brush Manufacturer, 11, Great Marlborough-street, W.; 5. C. Nightingale, London, Feather and Hair Merchant, 88, Gloucester-place, Portman-square, W.

CLASS XXVI.—LEATHER, INCLUDING SADDLERY AND HARNESS.

SECTION A.—*Leather, and Manufactures generally made of Leather.*

1. M. Blackmore, London, late Leather Dresser, East Moulsay, S.W.; 2. Fauler, France, late Manufacturer, Member of the Chamber of Commerce, Paris; 3. J. George, London, Wholesale Leather Factor, 4, Skinner-street, E.C.; 4. Lang-Gores, Zollverein, Manufacturer, Malmédy; 5. Wm. Linley, London, Leather Factor, 30, West Smithfield, E.C.; 6. Major-Gen. Count E. Martini di Cigala, Italy, Aide-de-camp to His Majesty; 7. Piret Pauchet, Belgium; 8. Moritz Pollak, Austria, Manufacturer and Merchant; 9. Jean Reymod, Switzerland, late Currier, Morges.

SECTION B.—*Saddlery and Harness.*

1. Earl of Bessborough, *Chairman*, London, Master of the Buckhounds, 40, Charles-street, Berkeley-square, W.; 2. Hy. Brace, Walsall, Wholesale Saddler, 3, Norfolk-road, St. John's Wood, N.W.; 3. C. Joyce, Egypt, Merchant, 32, Moorgate-street, E.C.; 4. Leblanc, France, Late Officer of the Imperial Navy; 5. Ben. Long, Manchester, Saddler, Brent-house, Hendon, N.W.

CLASS XXVII.—ARTICLES OF CLOTHING.

SECTION A.—*Hats and Caps.*

1. Cavaré, France, late Merchant; 2. George Christy, London, Hatter, 35, Gracechurch-street, E.C.; 3. S. B. Eveleigh, Manchester, Hat Manufacturer, 4, Hereford-square, S.W.; 4. Aloys Isler, Switzerland, Straw Manufacturer, Wildeg; 5. Wm. Swinscow, London, Furrier, Loman street, Southwark, S.E.

SECTION B.—*Bonnets and General Millinery.*

1. Thomas Brown, London, Wholesale Milliner, 85, Wood street, Cheapside, E.C.; 2. Henry Gregory, London, Straw Bonnet Maker, 15, Aldermanbury, E.C.; 3. Alphonse Payen, France, Merchant, Member of the Chamber of Commerce of Paris; 4. Samuel Sugden, London, Warehouseman, 12, Aldermanbury, E.C.

SECTION C.—*Hosiery, Gloves, and Clothing in general.*

1. J. D. Allcroft, London, Glover, 55, Porchester-terrace, W.; 2. J. R. Allen, Nottingham, Hosier, 8, King Edward-street, E.C.; 3. F. Esche, Zollverein, Manufacturer, Limbach; 4. Gaussen, France, late Manufacturer; 5. Joseph Gunkel, *Chairman*, Austria, Member of the Chamber of Commerce, Vienna; 6. J. Hunter, London, Robe Maker to the Queen, and Tailor, 34, Maddox-street, W.; 7. Luigi Scalia, Italy, Member of the Italian Parliament; 8. Vanderborght, Belgium, Manufacturer.

SECTION D.—*Roots and Shoes.*

1. J. K. Bowley, London, Bootmaker, 53, Charing-cross, W.C.; 2. R. D. Box, London, Shoemaker, 187, Regent-street, W.; 3. Gervais (Caen), France, Director of the Upper School of Commerce; 4. Huber, Zollverein, Director of the Chamber of Commerce of Stuttgart; 5. Jas. Medwin, London, Bootmaker, 86, Regent street, W.; 6. Fred. Suess, Austria, Manufacturer.

CLASS XXVIII.—PAPER, STATIONERY, PRINTING, AND BOOKBINDING.

SECTION A.—*Paper, Card, and Millboard.*

1. Bart. Cini, Italy, Member of the Italian Parliament

2. Charles Cowan, F.R.S.E., Edinburgh, Paper Manufacturer, 11, Sussex-place, S. Kensington, W.; 3. E. Hoesch, Zollverein; 4. Wyndham S. Portal, Basingstoke, Paper Manufacturer, 3, Wilton-crescent, Belgrave square, S.W.; 5. Sainte-Claire-Deville, France, Member of the Institute, Professor at the Normal School, 3, Byng-place, Gordon-square, W.C.; 6. W. R. Spicer, London, Wholesale Stationer, 19, New Bridge-street, E.C.

SECTION B.—*Stationery.*

1. Warren de la Rue, F.R.S., F.C.S., London, Ornamental Stationer, 110, Bunhill-row, E.C.; 2. List, Zollverein, Manufacturer, Frankfort-on-the-Maine; 3. Victor Masson, France, Judge to the Tribunal of Commerce of the Seine, 21, Pelham-crescent, S.W.; 4. Earl Stanhope, F.R.S., *Chairman*, London, 31, Grosvenor-place-houses, S.W.; 5. H. Stevens, F.S.A., F.R.G.S., United States, Literary Agent, 4, Trafalgar-square; 6. C. Venables, Bath, late Papermaker, 42, Cambridge-terrace, W.

SECTION C.—*Plate, Letterpress, and other Modes of Printing.*

1. Adam Black, M.P., London, 24, James-street, Buckingham-gate, S.W.; 2. George Clowes, London, Printer, Duke-street, Stamford-street, S.; 3. Giuseppe La Farina, Italy, Member of the Italian Parliament, Councillor of State, late Minister in Sicily; 4. Ch. Girardet, Austria, Manufacturer; 5. Jamar, Belgium, Member of the Chamber of Representatives, 21, Norfolk-street, W.C.; 6. H. Korn, Zollverein, Bookseller and Printer, Breslau; 7. Laboulaye, France, late Type-founder; 8. W. Spottiswoode, F.R.S., London, Her Majesty's Printer, 19, Chester-street, W.

SECTION D.—*Bookbinding.*

1. J. Gibson Craig, W.S., Edinburgh; 2. Ch. Reed, F.S.A., London, Printer, Foundry, Fann-street, E.C.; 2. Jas. Toovey, London, Bookseller and Publisher, 177, Piccadilly, W.; 4. L. Wolowski, France, Member of the Institute, Professor to the Conservatory of Arts and Manufactures, 27, Duke-street, St. James's, S.W.

CLASS XXIX.—EDUCATIONAL WORKS AND APPLIANCES.

SECTION A.—*Books and Maps.*

1. Hon. and Rev. S. Best, London; 2. Robt. Chambers, F.R.S.E., Edinburgh, Editor and Publisher, 6, Hall-road, St. John's-wood, N.W.; 3. Gottfried Müller, Austria, Professor, Hermannstadt; 4. Antonio Panizzi, D.C.L., Italy, Librarian, British Museum; 5. Robert, France, Master of Appeals to the Council of State; 6. Nassau Senior, London, 13, Hyde-park-gate, W.

SECTION B.—*School Fittings, Furniture, and Apparatus.*

1. Rt. Hon. C. B. Adderley, M.P., London, 35, Eaton-place, S.W.; 2. Marquis Gustavo Benso di Cavour, *Chairman*, Member, Italian Parliament, 44, Thurloe-square, S.W.; 3. Hy. Chester, Esq., London, late Secretary to Committee of Council of Education, 63, Rutland-gate, W.; 4. Rev. M. Mitchell, London, one of H.M.'s Inspectors of Schools, Education Department, Council Office, S.W.; 5. Léon Say, France; 6. Sir J. K. Shuttleworth, F.R.G.S., F.G.S., London, 38, Gloucester-square, Hyde-park, W.

SECTION C.—*Appliances for Physical Training, including Toys and Games.*

1. E. Chadwick, C.B., London, 5, Montague-villas, Richmond, S.W.; 2. Viscount Enfield, M.P., London, 7, Charles-street, Berkeley-square, W.; 3. Flandin, France, Councillor of State; 4. R. Monckton Milnes, M.P., London, 16, Upper Brook-street, W.; 5. Dr. Rud. Wagnen, Zollverein, Professor, Würzburg.

SECTION D.—*Specimens and Illustrations of Natural History and Physical Science.*

1. Cloquet, France, Member of the Institute, Professor of Medicine; 2. Rev. B. M. Cowie, B.D., London, one of

Her Majesty's Inspectors of Schools, 62, Queen's-gardens, W.; 3. J. E. Gray, Ph. D., F.R.S., Keeper of Zoological Collection, British Museum, W.C.; 4. N. S. Maskelyne, London, Keeper of Mineralogy, British Museum, W.C.

CLASS XXX.—FURNITURE AND UPHOLSTERY, INCLUDING PAPERHANGINGS AND UPHOLSTERY.

SECTION A.—*Furniture and Upholstery.*

1. Dr. Beeg, *Chairman*, Zollverein, Principal of the School of Industry and Commerce, Fürth, 48, Brompton-square, S.W.; 2. Lord de l'Isle, London, St. George's Hotel, Albemarle-street, W.; 3. Demanet, Belgium, Member of the Department of Fine Arts of the Royal Academy, Belgium; 4. Count Denictrio Finocchietti, Italy, Vice-Governor of the Royal Palaces at Florence; 44, Thurloe-square; 5. Wm. Holland, London, Upholsterer, 28, Mount-street, Grosvenor-square, W.; 6. John Jackson, London, Carton Pierre Manufacturer, 49, Rathbone-place, W.; 7. M. Markert, Austria, Manufacturer, Vienna; 8. L. Pighlein, North Germany, Cabinet-maker, 15, Montpelier-street, S.W.; 9. J. H. Pollen, Rome, 11, Pembroke-crescent, W.; 10. Du Sommerard, France, Director of the Museum of Cluny, 3, Ovington-square, S.W.; 11. Sir C. Trevelyan, K.C.B., India, 8, Grosvenor-crescent, Belgrave-square, S.W.; 12. Digby Wyatt, F.S.A., London, Vice-President, Royal Institution of British Architects, 37, Tavistock-place, W.C.

SECTION B.—*Paperhangings and General Decoration.*

1. Lord Ashburton, F.R.S., London, President of the Royal Geographical Society, 82, Piccadilly, W.; 2. Marquis F. A. Gattinara di Breme, Master of the Ceremonies, Director-General of the Royal Albertine Academy, Senator, &c.; 3. J. G. Crace, London, Decorator, 14, Wigmore-street, W.; 4. Jos. Forguignon, North Germany, Upholsterer, 12, Greek-street, W.; 5. A. J. Beresford Hope, M.A., London, 1, Connaught-terrace, Hyde-park, W.; 6. Owen Jones, London, Architect, 9, Argyll-place, Regent-street, W.; 7. Prosper Mérimée, France, Senator, Member of the Institute.

CLASS XXXI.—HARDWARE.

SECTION A.—*Manufactures in Iron.*

1. J. G. Appold, F.R.S., London, Fur Skin Dyer, 23, Wilson-street, Finsbury, E.C.; 2. William Bird, London, Iron and Tin-plate Merchant, 3, Laurence Pountney-hill, E.C.; 3. Giulio Curioni, Italy, Secretary to the Royal Lombard Institute of Sciences; 4. Daubrée, France, Engineer in Chief to the Imperial Corps of Mines; Professor to the Museum of Natural History; 5. Chev. de Fridau, Austria, Proprietor of Iron and Steel Works, Styria; 6. A. Grill, Sweden, Director of Mines; 7. H. E. Hoole, Sheffield, Stove-grate Manufacturer, 14, Percy-street, Rathbone-place, W.; 8. J. Oakes, Alfreton, Ironmaster; 9. Dr. D. S. Price, F.C.S., London, 26, Great George-street, Westminster, S.W.; 10. L. Ravené, Jun., Zollverein, Manufacturer, Berlin; 11. George Shaw, Birmingham, Patent Agent, Old Hummums Hotel, W.C.; 12. Trasenster, Belgium, Professor at the University of Liège.

SECTION B.—*Manufactures in Brass and Copper.*

1. S. Buckley, Birmingham, Merchant; 2. E. Gem, Birmingham, Merchant; 3. P. C. Hardwick, London, Architect, 21, Cavendish-square, W.; 4. De Longpérier, France, Member of the Institute; Conservator of the Museum of the Louvre; 5. Ferdinand Stamm, Ph. D., Austria, Member of the Austrian Parliament; 6. Dr. von Steinbeis, *Chairman*, Zollverein, Director of the Royal Central Board of Industry and Commerce, Stuttgart; 7. A. Tylor, London, Brass Founder, Warwick-lane, Newgate-street, E.C.

SECTION C.—*Manufactures in Lead, Tin, and Zinc, and General Hardware.*

1. Robert Fletcher, Birmingham, Merchant; 2. Gol-

denburg, France, Manufacturer; 3. W. A. Rose, London, Alderman, Lead Merchant, Queenhithe, E.C.; 4. G. Stobwasser, Zollverein, Manufacturer, Berlin; 5. J. S. Wyon, London, Chief Engraver of H.M.'s Seals, 287, Regent-street, W.

CLASS XXXII.—STEEL.

SECTION A.—*Steel Manufactures.*

1. J. Brown, Sheffield, Mayor of Sheffield, Great Northern Hotel, King's-cross, N.; 2. Frémy, France, Professor at the Museum of Natural History, and at the Polytechnic; 3. Robert Jackson, Sheffield, Steel Manufacturer, 26, Palace-gardens-terrace, W.; 4. Thomas Jessop, Sheffield, Steel Manufacturer, 26, Palace-gardens-terrace, W.; 5. Dr. Karmarsh, Zollverein, Director of the Royal Polytechnic School, Hanover, 26, Palace-gardens-terrace, W.

SECTION B.—*Cutlery and Edge Tools.*

1. Henry Atkin, Esq., London, Merchant, late Master Cutler, 32, New Broad-street, E.C.; 2. De Hennezel, France, Engineer to the Imperial Corps of Mines. 3. M. Hunter, jun., Sheffield, Cutler, 67, King William-street, E.C.; 4. Wm. Matthews, Sheffield, Past Master Cutler, 46, Salisbury-square, Fleet-street, E.C.; 5. Basil Roshkof, Russia, Colonel of Mining Engineers; 6. F. Wertheim, Austria, Vice-President of the Chamber of Commerce, Vienna; 7. Lord Wharfedale, *Chairman*, London, 15, Curzon-street, W.

CLASS XXXIII.—WORKS IN PRECIOUS METALS AND THEIR IMITATIONS, AND JEWELLERY.

1. Tommaso Corsi, Italy, Member of the Italian Parliament, late Minister of Agriculture, Industry, and Commerce; 2. C. W. S. Deakin, Birmingham, Merchant; 3. A. M. Dowleas, India, Secretary to the Bengal Central Committee for the Exhibition; 4. Fred. Elkington, Birmingham, Silver Plater, 97, Gloucester-terrace, Hyde-park, W.; 5. Fossin, France, late Judge to the Tribunal of Commerce, 5, Thurloe-square, Brompton, S.W.; 6. Fred. Friedland, Austria, Member of the Chamber of Commerce, Prague; 7. J. Hunt, London, Goldsmith, 156, New Bond-street, W.; 8. A. Kaiser, Zollverein, Manufacturer, Pforzheim; 9. H. J. Lias, London, Prime Warden, Goldsmiths' Company, 18, Regent's-park-terrace, Gloucester-gate, N.W.; 10. W. Maskell, M.A., Bristol, 24, Onslow-square, S.W.; 11. Lord Stratford de Redcliffe, G.C.B., *Chairman*, Turkey, 29a, Grosvenor-square, W.; 12. Rev. Montague Taylor, London, 42, Gravenhill-gardens, W.

CLASS XXXIV.—GLASS.

SECTION A.—*Stained Glass and Glass used for Decoration.*

1. J. R. Clayton, London, Glass Stainer, 351, Regent-street, W.; 2. W. Dyce, R.A., London, Streatham, S.; 3. Sir Philip De M. Grey Egerton, M.P., F.R.S., London, 28a, Albemarle-street, W.; 4. J. R. Herbert, R.A., London, 7, Grove-end-place, N.W.; 5. E. Peligoz, France, Member of the Institute; Professor at the Conservatory of Arts and Manufactures, and at the Central School of Arts and Manufactures.

SECTION B.—*Glass for Household Use and Fancy Purposes.*

1. R. L. Chance, Birmingham, Glass Manufacturer, 51, Wimpole-street, Cavendish square, W.; 2. Alf. Copeland, London, Glass Manufacturer, 169, New Bond-street, W.; 3. Jas. Hartley, Sunderland, Glass Manufacturer; 4. Jonet, Belgium, Member for the Chamber of Commerce at Charleroi; 5. Apsley Pellatt, London, late Glass Manufacturer, Knowle-green, Staines; 6. Pelouze, *Chairman*, France, Member of the Institute; President of the Commission of Money and Medals; 7. Fred. Schmitt, Austria, Secretary of the Statistical Department, Board

of Trade, Vienna; 8. F. Wisthoff, Zollverein, Manufacturer, Königs-Stelle.

CLASS XXXV.—POTTERY.

1. Marquis D'Azeglio, Italy, Envoy Extraordinary and Minister Plenipotentiary of Italy; 2. Thomas Battam, F.S.A., London, 5, Aubrey-villas, Holland-park, W.; 3. Right Hon. W. E. Gladstone, M.P., *Chairman*, London, Chancellor of the Exchequer, 11, Carlton-house-terrace, S.W.; 4. Sir Thos. Gresley, Bart., Burton-on-Trent; 5. J. Marryat, London, Banker, 17, Upper Eccleston place, Pimlico, S.W.; 6. Regnault, France, Member of the Institute, Professor of the College of France, Engineer-in-Chief, Imperial Corps of Mines, Director of the Imperial Manufactory at Sèvres, &c.; 7. J. G. Robinson, London, Superintendent of Art Collection, Department of Science and Art, South Kensington Museum, W.; 8. Chr. Fischer, Zollverein, China Manufacturer; 9. J. Webb, London, 11, Grafton street, Berkeley-square, W.

CLASS XXXVI.—DRESSING CASES AND DESPATCH BOXES AND TRAVELLING CASES.

1. Chas. Bazin, London, Dressing Case Manufacturer, 112, Regent-street, W; 2. Beriah Botfield, M.P., F.R.S., London, 5, Grosvenor-square, W.; 3. Fink, Zollverein, Councillor of Commerce, Darmstadt; 4. Lord Harris, K.S.I., London, late Governor of Madras, 28, South street, Grosvenor-square, W.; 5. Sir Thos. Phillips, F.G.S., *Chairman*, London, Vice-President and Chairman of the Council of the Society of Arts, 11, King's Bench Walk, Temple, E.C.; 6. N. Rondot, France, Merchant; 7. F. West, London, Cutler, 1, St. James's-street, S.W.

A NEW PROJECTILE FORCE.

By THOMAS M. MESCHIN, D.C.L., F.S.A., OF THE INNER TEMPLE, BARRISTER.

Water may be decomposed into its constituent elements, oxygen and hydrogen gases, either by voltaic electricity, by common electricity, by magneto-electricity, or by thermo-electricity.

1ST. BY VOLTAIC ELECTRICITY.—When the electrodes of a voltaic battery are brought near each other, in acidulated water, or, in other words, when water is made part of a galvanic circuit, so that the current of electricity passes through it, decomposition ensues—its constituent elements, oxygen and hydrogen gas, are evolved at the electrodes.

2ND. BY FRICTIONAL ELECTRICITY.—Water may also be decomposed by passing a succession of discharges of common electricity through it. This was accomplished so early as 1789, by Messrs. Dieman Paetz and Von Troost-wych. Professor Faraday and Mr. Goodman have also succeeded in obtaining true electro-polar decomposition of water by the action of frictional electricity.

3RD. BY MAGNETO-ELECTRICITY.—Water can also be decomposed by a magneto-electric apparatus, for if it be made part of the circuit, as often as the circuit is completed, a current of electricity passes through the water, and the gases are thereby evolved.

4TH. THERMO-ELECTRICITY.—Water is very easily decomposed by a thermo-electric pile, the electrolysing action of which is maintained by keeping the ends of the bars of which the pile is composed, the one at a high and the other at a low temperature.

The different forms of electricity known under the above names, may be used either separately or simultaneously for the decomposition of the water in the gas generator.

When this evolution of the gases takes place in a close vessel, or gas generator, a gradually augmenting compression necessarily results, which does not affect the evolution of the gases in the slightest degree. An exceedingly high pressure may thus be obtained in the gas generator or

close vessel. Dr. Daniel raised it to the enormous tension of 56 atmospheres, or 840 lbs. on the square inch.

In the "Philosophical Transactions of the Royal Society, 1839," vol. 129, p. 93, 94, Professor Daniel thus describes an experiment:—"The evolution of gas, which was measured at short intervals, took place with perfect regularity, and did not appear to be in the slightest degree affected by the gradually increasing compression. In four and a half minutes, when 19 cubic inches had been collected, the compression tube burst with a loud explosion, and the fragments, which were very small, were scattered all over the laboratory. If we were to calculate that 19 cubic inches were compressed into three-tenths of an inch space unoccupied by the liquid, this would be a compression of 63 into 1, and the pressure would amount to nearly 940 lbs. on the square inch; but if we reckon, as was probably the case, that two cubic inches of the gases were kept down by the solvent power of the liquid at this high pressure, then the compression would have amounted to 56 into 1, and the pressure to 840 lbs. on the square inch."

ELECTRIC GAS GUN.

The gases evolved at a high pressure from the decomposition of water by electricity, constitute a projectile force of very great intensity. By using them in the same way that air is employed in an air-gun, the greatest conceivable force may be impressed upon a projectile, a force, apparently, only limited by the strength of the materials of which the gas-generator is composed. Gunpowder is itself only a highly inflammable mixture, which, on being ignited, is rapidly converted into gases at a high pressure, and the gases in the electric-gas-gun would act upon the projectile in precisely the same way as the gas resulting from the ignition of gunpowder acts upon a similar projectile in an ordinary cannon; thus the force of gunpowder and that of these gases are analogous.

As to the form of an electric gas gun, it is similar to a breech-loading gun or cannon. Attached to the breech is a reservoir, or gas generator, in which water is converted into the gases at such high pressure as the officer in command may deem requisite. There is a communication between the gas-generator and the barrel or chase of the weapon, which can be opened or closed at pleasure, but which, if not closed before, will close of its own accord when the full charge of the weapon has passed into the barrel. This is accomplished either by a slightly conical piston or spigot, acting in a small hole through the barrel of the weapon, so placed that when a shot has passed over the point where it is situated, the gases press upon this piston or spigot (which is kept down by a spring), and raising it by their pressure, it acts by suitable mechanical contrivance upon the apparatus for closing the communication; or by making the shot, when it passes over a certain point in the bore, complete and break an electric circuit, which acts by suitable machinery upon the apparatus for closing the communication.

An apparatus for closing this communication is so constructed, that when it is completely closed, and not by any possibility till then, several electric sparks are passed through the gases in the barrel, which result in their explosion, and the discharge of the weapon, for I should have mentioned that these gases are endowed with a second element of force—they may be combined by an electric or other spark; or the gases may be exploded as gunpowder by the percussion of ordinary detonating powder. In combining they expand to fifteen times their volume. When the shot has, by passing from the breech to the muzzle, attained the uniformly accelerated velocity due to the high pressure of the gases, and is on the point of leaving the weapon, if the gases be then exploded the explosion will impress a force upon the shot equal to fifteen times the pressure of the gases. The small portion of pure water, which is formed by the combination of the gases, is condensed like dew on every part of the bore, and serves to lubricate the weapon, or, according to the tem-

perature of the barrel, remains in the form of vapour, and is driven out by the succeeding discharge—the barrel never needs cleaning.

At the breech there is an aperture through which the shot is introduced into the barrel with great rapidity after each discharge, by means of a very simple piece of mechanism. The aperture has its edges bevelled outwards to insure the fitting of the piece that fills it up when the shot is introduced; there are several of these pieces accurately fitting this aperture, connected with each other by suitable links, and forming an endless chain. When the weapon is in the act of being discharged, there is a strong band, nearly half the circumference of the outside of the barrel, which is so fastened by adequate mechanical contrivances, that on the recoil of a gun after the discharge, the band is loosened by the action of the recoil, and the piece occupying the aperture falls out, and another piece bearing a shot, is brought by the action of the recoil of the weapon up an incline, under the aperture, which piece, by the return action of the weapon down the incline, is, with the shot upon it, forced into the barrel, and the band again fastened by the same return action. The shot is delivered from a hopper or reservoir of shot, (or may be placed by the hand) upon one of the pieces, by means of and during the upward action of the recoil. Instead of the band or in conjunction with it, a strong bar may be used, attached by a sort of hinge to the weapon, near the muzzle, and so arranged that when the weapon is being discharged, the end of the bar presses, with the whole weight of the weapon, against the piece occupying the aperture so as to resist the force of the gases, and when the weapon recoils, the pressure of the bar against the piece ceases and suffers it to fall out, and the next shot is introduced in the manner before described, whereupon the bar is made, by suitable mechanical contrivances, to resume its pressure against the piece by the return action of the recoil.

It is intended that the weapon shall be loaded, aimed, discharged, and entirely worked by machinery, and that the weapon and its whole working shall be capable of being fought, and in every way controlled by a single man.

The force thus developed would seem to be the best possible force to which a projectile could be subjected—a uniformly accelerated force while moving along a rifled barrel, and then (when it has received from the rifled bore a motion round its own axis) an almost instantaneous accession of immense force. It is quite obvious that these conditions are much more favourable for allowing the length of the bore or barrel of the weapon to be increased, and thereby securing greater precision of aim, and are also more favourable for the preservation of the weapon, than when the projectile is, as in the case of gunpowder, subjected to a constantly increasing and then to a constantly diminishing force. It is not, perhaps, too much to say, that a rifled electric gas gun would wear as long as a couple of rifled cannons in which gunpowder was used.

Sir H. Douglas says (p. 47):—"The main principle which should govern our choice of naval guns is, to prefer those which, with equal calibre, possess the greatest point blank range; and the practical maxim for using them should be to close to, or within that range, and depend upon precision and rapidity of fire. This is the most simple and the most efficacious use of artillery."

An electric gas gun, if wrought by machinery, would have the greatest possible precision, and its rapidity of fire might rival that of a revolver; and it is perfectly obvious that it might be lengthened to any extent, so as to secure the greatest attainable point blank range.

"It is known, both from theory and practice," says Sir Howard Douglas (p. 96), "that with equal charges and guns of equal weight, but of different lengths, the velocity of the shot increases with the length of the bore." Now these gases are much more capable of being used in weapons with great length of bore than gunpowder,

because the shot is driven from the breech to the muzzle, not, as in gunpowder, by a constantly increasing, and then a constantly diminishing force, but by a uniform, or nearly uniform force, which is perfectly under command, and then is subjected to an explosive force; these are the very properties in a projectile force most favourable to precision, and the greatest point blank range. From practice at Deal, in 1839, with 32 pounder guns, one 9 ft. 6 in., and the other 6 ft. 6 in. long, with charges of 6 lbs., and windage of .175, the elevation being one degree, the range of the longer gun was 853 yards, while that of the shorter one was only 734 yards.

These experiments show the very important effects resulting from a lengthened bore, but, owing to the nature of gunpowder, the limit to the length that can be used in practice is soon reached; but the case, as respects the gases, is wholly different; there is nothing whatever to prevent that length being adopted, in the electro-gas gun, which will secure the maximum result.

These gases have another great and pre-eminent advantage over gunpowder, viz., that the force impressed upon the projectile may be varied according to the work intended to be done by it. If a *ricochet* is required, only a small quantity of the gas may be admitted into the barrel of the weapon; no time need be wasted in altering the charge, the officer in command may increase or diminish the intensity of every succeeding shot without the slightest difficulty or delay. This would be in the highest degree useful, as well as economical, in finding and altering ranges—useful when a tentative process was desirable; economical, because the angle of elevation which gave the maximum result for the minimum expenditure of gas might be given to the weapon, and the charge varied with the required range.

From the experiments of Robins and others, it appears that when gunpowder is ignited, one-half of it is converted into gases (the principal of which are carbonic acid and azote) and the remaining half assumes the form of solid matter. If the powder be loose, the volumes of the gases are from 236 to 260 times that of the powder; in rammed powder from 480 to 520 times the volume of the powder. As to the expansion of the gases due to the elevated temperature at which they are generated by the ignition of the powder, the estimates are widely dissimilar. Robins sets down the absolute explosive force of gunpowder equal to 1,000 atmospheres, that is, a pressure of 14,722 lbs. on the square inch; Hutton put it at 2,200 atmospheres, or 32,388 lbs. on the square inch. It is obvious that a considerable portion of the heat is absorbed by the gun.

With respect to the air-gun, the "Encyclopædia Metropolitana" remarks, adopting the estimate of Robins, "if the air-gun be condensed ten times, the velocity will be equal to one-tenth of that arising from gunpowder; if condensed twenty times, the velocity would be one-seventh that of gunpowder, and so on. Air-guns, however, project their balls with a much greater velocity than that assigned above, and for this reason, that as the reservoir of condensed air is commonly very large in proportion to the tube which contains the ball, its density is very little altered by passing through that tube, and consequently the ball is urged all the way by nearly the same force as at the first instant; whereas the volume of the gas arising from inflamed gunpowder is very small in proportion to the barrel of the gun, and by dilating into a comparatively large space as it urges the ball along the barrel or tube, is proportionately weakened, and it always acts less and less upon the ball in the tube. Hence it happens that air compressed only ten times into a large receiver will project its ball with a velocity little inferior to gunpowder."

What is here said of air applies with equal force to the gases. Besides, the ignition of the charge of gunpowder is not instantaneous; it is a progressive operation, so that the ball when projected by gunpowder is subject, when passing from the breech to the muzzle, first to a constantly increasing, and then to a constantly diminishing force.

It will be interesting to contrast the cost of gunpowder and of the gases. The length of a 68-pounder is 9.49 feet; the effective length is less by the semi-diameter of the bore, which is 8.12 inches—the length is, therefore, 9.11 feet, and the capacity 4.41 cubic feet. As a ton of zinc evolves 1966 cubic feet of the gases under a pressure of ten atmospheres, and as its price varies from £20 to £30, the cost per round of shot, out of a 68-pounder, would be as follows, under the following pressures. At—

10 atmospheres	Os. 9d. at £20	—	1s. 4d. at £30.
20	1 9	—	2 8
40	3 7	—	5 4
60	5 4	—	8 0
80	7 2	—	10 9
100	8 2	—	13 5

Now, if the “*Encyclopædia Metropolitana*” be correct in saying that air, compressed ten times, will project a ball with a velocity little inferior to gunpowder, surely these gases, when compressed ten times, that is, to a pressure of ten atmospheres, and exploded, ought to rival or surpass gunpowder, as they would, in addition to the force due to the ten atmospheres, impress a force on the projectile, at the moment of its flight, fifteen times that pressure. But when contrasting the cost of the gases as a projectile force, and that of gunpowder, it is safer to be under, rather than over the mark, so then, notwithstanding the *dictum* of the “*Encyclopædia Metropolitana*,” we will base our calculation on the assumption that the gases condensed 20 times, and developing on their explosion a force equal to 300 atmospheres, will produce effects equal to those of gunpowder; the cost for shot will, as we have just seen, be from 1s. 9d. to 2s. 8d.*

The cost of gunpowder varies, of course, with the price of the articles from which it is manufactured; it ranges from one to two shillings per lb. A 68-pounder takes 16 pounds for a charge; the cost per shot is therefore from 16s. to 32s., consequently the gases are by far the cheaper force, for even at 100 atmospheres they would only cost from 8s. 2d. to 13s. 5d., scarcely one-half the price of gunpowder, but at 20 atmospheres they would scarcely be one-tenth of the price.

Gunpowder is deteriorated or destroyed by the absorption of moisture; this could not happen to the gases. This absorption of damp is a constant cause of “great and unknown losses of strength,” and a little more or less moisture will alter most materially the accuracy of practice. Attempts to protect gunpowder from moisture are a constant source of heavy outlay, which should be borne in mind when comparing the relative cheapness of the forces, and “no degree of care” can altogether preserve it from receiving some injury. (Sir H. Douglas.)

Then the force impressed upon the projectile might be increased *ad libitum*. This cannot be done with gunpowder, for if the charge be increased beyond a certain point, a diminution of force results, as part of the powder is shot away unignited, and the powder ignited acts for a shorter space on the ball, but in the electric-gas gun the pressure may be raised to any point in the gas generator so as to impress the required force upon the projectile; thus, if it was found that a 100-pounder, propelled by a force equal to that of gunpowder, had no effect upon an iron-plated vessel, the force might be doubled or trebled until the desired result was achieved; indeed, it is probable that these weapons would settle the question of armour-plates, because if, as Mr. Scott Russell holds, the thickness of the plates cannot be usefully increased beyond $4\frac{1}{2}$ inches, as soon as a weapon is constructed of sufficient force to destroy this armour, it will cease to be a protection, and will only insure the sinking or capsizing of the unlucky vessel it was intended to protect, like the knights of former days, whose armour at last became so heavy that, if they chanced to be unhorsed, they were compelled to lie prone,

unable either to renew the fight, or to consult their safety by a retreat.

It may be observed that it would be difficult, when the firing proceeded from works in any way extensive, or from masked batteries, for an enemy to discover the precise point where one of these weapons which threw the projectiles was situated, as there would be no smoke and no report (for a vacuum would be formed by the explosion of the gases). In most cases this would prove of signal advantage, among others—as not affording a mark for the shot of the enemy, should he seek to disable the weapon. Besides, the absence of smoke would not interfere with the aim of other weapons, and the absence of noise would enable the orders given by those in command to be distinctly heard.

There would be practically no report; the report, such as it would be, could not be heard beyond a few yards—it would be 500 times less than that of a cannon, and 10 times less than that of an air-gun.

When a cannon becomes heated by repeated discharges of gunpowder, the elasticity of the metal of which it is composed is diminished, and the properties of the weapon are impaired. It is probable that rifled cannon (other things being equal) are liable to be more quickly heated than those with a smooth bore, owing to the fact that the ball meets with greater resistance in moving along a rifled bore than a smooth bore, and consequently consumes more time in reaching the muzzle. The barrel of the weapon is therefore subjected for a longer period to the action of the highly heated gases evolved by the ignition of the gunpowder. This result could not arise from the action of the gases in the electric-gas gun, for the heat evolved by the detonation of the gas is by no means great. The electric-gas gun is therefore, so far as this point is concerned, the more perfect weapon, being capable of more incessant and prolonged work.

The electric-gas gun is eminently suited for being wrought by machinery, thereby securing greater precision of aim, greater rapidity in firing, and enabling one man to accomplish the work of many. The recoil of the gun might also, if necessary, be turned to account in increasing the condensation of the gases, and for the purpose, when requisite, of forcing water into the gas generator when the weapon is in action, to replace that consumed by discharging the weapon. This may be accomplished by a plunger, similar to that of a Bramah press, moving in the plane of the recoil.

An electric-gas-gun, if wrought by machinery, might be made to cover an object as accurately and with as much precision as a theodolite, the rapidity of its discharge might be made to rival or surpass that of a revolver, only it would be continuous and not limited, as in a revolver, to half a dozen rounds, and it would be as much under the control of one man as the most gigantic of our steam-engines. The machinery for the weapon might be wrought by a donkey engine, the cylinders of which could be supplied from the gas generator, in the manner mentioned below. In a fortress or ship defended by a few such weapons, one man might do the work of fifty.

In the interests of peace, it is no small recommendation in favour of these weapons that they are more calculated for defence than for offence.

The steam gun, as is well known, throws its projectiles with great rapidity. Now if the gases of which I have been speaking were substituted for steam they would be much more efficient; firstly, because a higher pressure could be obtained with much less danger; and, secondly, at the moment the projectile was leaving the tube or barrel the gases might be exploded, thus impressing upon the ball or projectile an augmented force fifteen times greater than that to which it is subjected in the American steam gun; consequently the ball or projectile would be at least fifteen or sixteen times more effective under the action of the gases in an electric gas gun, than it is under the action of the steam in the steam gun.

A cubic foot of water produces at the mean pressure

* See Appendix I., page 414.

about 1,980 cubic feet of the mixed gases—that is, about 1,320 cubic feet of hydrogen gas, and 660 cubic feet of oxygen gas, or nine pounds of water produce eight pounds of oxygen gas and one of hydrogen. A cubic foot of water produces 1,700 cubic feet of steam at the mean pressure 212° Fahr. The relative volume of the gases, at that pressure and temperature, would be 2,572 cubic feet, so that the advantages are on the side of the gases in this point very decidedly.

In a fortress defended by these weapons there would be no need to tremble for the safety of the gunpowder magazine, and the apparatus for supplying the electricity might be placed out of reach of harm. And now as to cost, after the first cost of the requisite apparatus has been defrayed, the cost of maintaining the electrolyzing action in the gas generator will mainly depend, if voltaic electricity be used, on the value of the materials consumed in the battery as compared with the value of the products of the battery. If common electricity be employed, its cost will be measured by the amount of mechanical effort necessary for its development. If magneto-electricity be used its cost will depend upon the mechanical force requisite to keep the magneto-electric machines in action. If thermo-electricity be employed its cost will depend on by the expense incurred in keeping the extremities of the bars of the thermo-electric piles at different temperatures.

The advantages of these electric-gas guns, as compared with gunpowder guns, are:—

1. The projectile force employed is very much cheaper than gunpowder.

2. Its practice is more certain and uniform, not being liable to be affected by damp, &c.

3. It is more under control; the force with which a projectile is driven may be diminished or augmented at pleasure.

4. It is capable of being wrought by machinery (driven by the gases from its own gas generator), thereby ensuring greater precision of aim, greater rapidity of firing, and enabling one man to do the work of many.

5. It is less dangerous, both to the men who work it, and to the ship or fortress which it defends, as it needs no powder magazine, which might be blown up by shot, shell, or lightning.

6. A force is applied to the projectile more favourably, resulting in less strain upon the weapon, and its greater durability; besides, not being liable to be heated, it is the more perfect weapon, being capable of more incessant and prolonged work.

7. The discharge being accompanied with neither smoke, flame, nor report, it could not afford a marked object for the enemy's shot.

8. Its superior powers of horizontal or point blank firing at low elevations, "the best test of the real power and value of a gun," "its real service value."

THE ELECTRIC-GAS SHELL.

These gases, evolved by the decomposition of water by electricity, may be forced, at a very high pressure, into metal shells, similar to shells used for offensive operations in war, the shells being so constructed that on striking any body, an electric spark, or detonating spark, could be elicited, which would result in the detonation of the gas and the bursting of the shell.

Then these gases might be used with other bodies in the shell, gaseous, liquid, or solid, that would contribute to augment the violence of bursting.

A NEW MOTIVE FORCE.

When gases are maintained at a high pressure or tension in a vessel, corresponding to the boiler of a steam engine, they will, if admitted into a cylinder, press upon the piston, and perform all the functions discharged by steam in working an engine.

ELECTRIC GAS ENGINE.

Gases generated under a high pressure, by the decomposition of water by electricity, will act fully as

effectively as steam when admitted into the cylinder of a steam engine. The pressure may be raised to a point at which it would be perilous to work steam, owing to the facility with which the strength of the reservoir may be increased. Then, no additional cost is incurred by working at the highest pressure; precisely the same electro-motive force is expended in effecting decomposition at all pressures. Thus the strength of the gas-generator is the only practical limit to this enormous force, the real obstacle to its most economical application, an obstacle which doubtless will gradually yield to the ingenuity of engine manufacturers.

These gases may be wrought expansively, which will result in very great augmentation of the work done by the engine, for the same expenditure of electro-motive force.

After the gases, by passing through the cylinder, have impressed upon the piston the force due to the pressure under which they are generated, they may be utilised in either of the following ways:—

I. By detonating the gases after they have expanded; while in the cylinder, they may be combined by an electric spark. In combining they expand to fifteen times their bulk, and consequently impress a force on the piston equal to fifteen times the pressure which the gases exerted. A heavy fly-wheel would prevent the loss of *vis viva* which might attend the suddenness of the application of this force.

When the gases are combined by an electric spark, they are converted into water, and a vacuum results similar to that occasioned in a condensing steam engine by the condensation of the steam. By the vacuum which is thus formed by the combination of the gases, the advantages of the high-pressure and condensing steam engines may be combined in the electric-gas engine.

The sources of force are, therefore, threefold.

1st. The high pressure in the gas generator, which may be taken at 50 atmospheres, or 736 lbs. to the square inch, although in high pressure steam engines it rarely exceeds 120 lbs. There can be little doubt but that the reservoir might be readily constructed sufficiently strong to work safely at a pressure of 60 or even 100 atmospheres, particularly when all the inducements which economy can hold out are on the side of high pressure in the electric-gas engines.

2nd.—The expansion of the gases to 15 times their volume exerts a force on the piston.

3rd.—A vacuum which will give a useful effect of from 13 to 14 pounds per square inch.

II. The combustion of the gases after passing through the cylinder, may be employed for heating the gases in the cylinder while expanding, and thereby increasing their elastic force; it is obvious that this heating process must be applied while the gases are in the cylinder, for no advantage would accrue from increasing their tension in the gas generator, as they can be evolved at the highest possible pressure there without additional expense, but if they be heated while expanding, it is obvious that the work done by them would be much increased.

III. By burning the gases after passing through the cylinder, for the development of thermo-electricity, to be employed in aid of the electricity used in decomposing water in the gas generator.

IV. By using the gases after passing through the cylinder for the purpose of developing electro-motive force, to go in aid of that employed in decomposing the water in the gas generator; theoretically the electro-motive force developed by the combination of the gases ought to decompose an amount of water equal to their own weight. This is, I believe, the theoretic effect of Groves gas battery.

Thus, then, the gases, after being used in the cylinder, may be employed in one of three ways:—1. For the production of an electro-motive force by thermo-electricity or by voltaic-electricity. 2. For the production of a detonating force, and the resulting vacuum. 3. For increasing by their combustion the tension of the gases in the cylinder.

It may be observed, that in an electric gas engine the

gases may be wrought expansively, which will not only result in considerable saving, but will also materially diminish the possible practical inconvenience of the detonation of the gases in the cylinder; if, for example, the gases were wrought at 50 atmospheres, and were allowed, before being detonated, to expand in the cylinder till the pressure was one quarter of an atmosphere, the pressure on the piston when detonated, would be less than one-twelfth of the initial pressure of the gases in the cylinder; what the proper amount of expansion to be allowed is, would very soon be practically determined, when the electric gas engines come into operation.†

The strength of the reservoir, or gas generator, in an electric-gas engine, corresponding with the boiler in a steam engine, might be increased to almost any amount required; the difficulties which prevent the strength of a steam boiler from being increased beyond a certain point could not operate as regards a gas generator. One of the main objects kept constantly in view in the construction of a steam boiler, is the securing the largest possible amount of heating surface; now the strength of a boiler is the strength of the weakest part of it, consequently, as its surface is extended, the chances of a flaw or weakness in some part of that surface are increased; then if the thickness of the plates were unduly increased it would interfere with the action of the fire. The riveting of the plates is estimated to reduce the strength one-third. The highest tension attained in high-pressure steam engines scarcely, if ever, exceeds eight atmospheres, or 120 lbs., per square inch; in an electric-gas engine, the highest pressure may be maintained in the gas generator at precisely the same cost as the lowest; consequently, the higher the pressure the less the expense for equal amounts of work done. With regard to the construction of the reservoir, or gas generator, the form of greatest strength may be adopted, and the thickness of its parts augmented to any conceivable amount.

If necessary, to obviate any danger that might possibly arise from the accidental detonation of the gases in the gas generator (if such a thing be possible), the gas generator may be divided into two compartments, in which each gas may be kept separate, thus rendering such a detonation wholly impossible. With regard to the cylinder, it may, if found requisite, be divided, during the first part of the stroke, into two separate compartments, proportioned in capacity to the respective volumes of the two gases, but so as that during the latter part of the stroke, the gases may become mixed, so as to be, if necessary, detonated by an electric or other spark.

The time must come, if it has not already arrived, when electricity will be produced more cheaply than steam. Every mechanical and chemical change which takes place in bodies, results in setting free some electricity; thus, if two bodies are in contact and they are suddenly removed, there is an electrical disturbance. When water boils electricity passes off in the steam. The fire in the grate and the flame of the gas-lamps are evolving electricity.

Every chemical change in the constitution of bodies results in the development of electricity. A galvanic battery merely collects and applies the electricity evolved by the chemical changes going on in its cells. If some method could be discovered of making the products of the chemical action in the battery as valuable, or nearly as valuable, as the zinc or other agents of which the battery is composed, the great problem would be solved, and electricity might take its place side by side with steam as a practical motive force.

In conclusion, I may observe that the proposed electric-gas engine and electric-gas gun are original ideas. It first struck me that electricity might be used as a motive force about 1849, when attending the lectures of a most able and

amiable gentleman, whose admirable Treatise on Heat ranks him high amongst modern philosophers.

I may also perhaps mention that I gave notice, before the meeting of the British Association in last September, of my intention of reading a paper on this subject, but was prevented, by unavoidable circumstances, from going to Manchester.

44, Chancery-lane, London.

APPENDIX I.

It should be remarked, that in the electric gas-gun and steam-gun the projectile, in its passage from the breech to the muzzle, is subjected to a constant force, and of course attains the uniformly accelerated velocity due to that force minus the sum of the resistances resulting from its passage along the barrel; then, as to the detonation, though popularly speaking it takes no time, it is really not so—no operation in nature is so—the lightning's flash consumes time; from hence it appears that $v^2 = 2fs$ is the correct formula.

In an ordinary cannon, until the whole of the charge of gunpowder is ignited, the force impressed on the ball is a constantly increasing force, and then it becomes a constantly diminishing force; this force varies as the space of the barrel traversed by the ball. The velocity of the ball when all the gunpowder has been ignited is equal to the square root of the force into the space, *i.e.*, $v = \sqrt{fs}$, but when the ball is urged by the gases, as the force is uniform, $v' = \sqrt{2f's}$, consequently the velocities are to each other as one to the square root of two, that is $v : v' :: 1 : \sqrt{2}$.

If the space traversed by a shot in its passage from the breech of the muzzle of the electric-gas gun be conceived to be divided into 100 parts, and the time of transit be also divided into a like number of equal parts, the space passed through under the action of the uniform force of the gases during the first division of time, will be to the space passed through during the last division of time, as 1 to 199; now, considering this immense acceleration, it is, perhaps, under the mark to assume that the force developed by the detonation of the gases would act upon the ball through the last ten of these spaces. The gases then act upon the ball through 90 spaces, and the explosion through 10 spaces.

If v be the velocity of a projectile urged by gunpowder, and v' the velocity of one projected by the gases, and f and f' be those forces respectively, and λ be the effective length of the weapon, λ' the length of the charge, and λ'' the space through which the detonation of the gases act upon the projectile, and x the co-efficient of expansion for the gases on explosion, then we have for gunpowder—

$$v = \sqrt{f(\lambda - \lambda')}, \text{ and for the gases—}$$

$$v' = \sqrt{2f'(\lambda - \lambda'') + 2xf\lambda''} \\ = \sqrt{2f'(\lambda + (x-1)\lambda'')}$$

but when gunpowder is used, λ' is one-third of λ , therefore $v = f, \sqrt{66.6}$ and $f = \frac{v^2}{66.6}$; but in the case of the

gases λ'' is ten, and $v' = \sqrt{2f'(100 + 140)} = \sqrt{480f'}$ and $f' = \frac{v'^2}{480}$. We have, therefore, the proportion

$f : f' :: \frac{v^2}{66.6} : \frac{v'^2}{480}$, but if v and v' be equal, we have $f' = 7.2f$, that is, if the gases in the gas generator be maintained at a pressure rather less than one-seventh that of the real pressure of the gases resulting from the explosion of gunpowder, they would produce an effect equal to that produced by gunpowder.

Sir H. Douglas says the charge producing the maximum velocity is about one-third of the length of the bore (p. 44). I assume the "charge" means the charge of gunpowder and shot, consequently, of the 100 parts, the gunpowder occupies 25.15. Hutton estimates that gunpowder expands 2,200 times its volume; the pressure on

† See Appendix II., page 415.

the shot when it reached the muzzle would consequently be a little more than one-fourth of that, or 550 atmospheres. But there are three deductions which must be made from this: first, the volume of the powder is less by the volume of the bag containing it, which, in a 68-pounder, would be about .02 foot—then there is the windage, for which Hutton deducted a third of the useful effect, but as these weapons are to be breech-loaders, we need not allow for windage—thirdly, part of the charge escapes through the vent. These three deductions would leave the force of the gases resulting from the ignition of the gunpowder at, say a third less, or .366 atmospheres, but it is seen above that $f = 7.2 f'$, therefore

$f' = \frac{366}{7.2} = 50.83$ atmospheres, which in round numbers gives a tension of 51 atmospheres, as that capable of imparting as high a velocity to a projectile as gunpowder. But as stated in the text, the precision and power of these weapons would be augmented by increasing the length of the bore. Let us suppose the bore of a 68-pounder lengthened by $\frac{1}{10}$'s then $\lambda - \lambda' = 150$, $\lambda = 160$. We have then—

$$v' = \sqrt{2 f' (160 + 140)} = \sqrt{600 f'} \text{ and}$$

$$f : f' :: \frac{v^2}{66.6} : \frac{v'^2}{600} \text{ therefore } f' = 9 f$$

$$\text{consequently, then } f' = \frac{366}{9} = 40.73$$

atmospheres, the gases at a pressure of 41 atmospheres can, in a 68 pounder, the effective length of whose bore is 13.63 feet, project a shot with the velocity with which a shot would leave an ordinary 68 pounder propelled by a charge of 16 pounds of gunpowder.

If the length of the bore of a 68-pounder were doubled, that is, if it were increased to nearly 19 feet, the gases in the gas generator would only require to be kept at a pressure of $25\frac{1}{2}$ atmospheres to project a shot with a velocity equal to gunpowder.

It may be remarked that nothing can be more widely different than the estimates that have been formed by the ablest writers on the precise measure of the explosive force of gunpowder. Sir H. Douglas says, "Much uncertainty exists respecting the expansive force of fired gunpowder," so that, notwithstanding what is contained in this note, the estimate based on the "Encyclopædia Metropolitana" in the text may be the right one.

APPENDIX II.

It may be interesting to attempt to indicate the work which the gases can perform when employed in an electric-gas engine, by taking the general formula as given by De Pambour for the steam-engine, which determines the load, the velocity, and the evaporation, substituting, of course, for Dulong and Petit's law for the expansion of steam, that of Boyle or Mariotte for the elastic force of gases.

Denoting by v the velocity of the piston in feet per second; a , the area of the piston in square feet; r , the load of the engine in pounds; s , the effective number of cubic feet of water decomposed in the reservoir per minute; l , the stroke of the piston in feet; l' , the portion traversed when the expansion begins; c , the clearance of the cylinder; f , the friction of the engine when unloaded; δ , the increase of friction accruing per unit of the load r ; p , the pressure against the opposite side of the piston; P , the pressure in the gas-generator; P' , the pressure in the cylinder before the expansion; R , the total resistance; s , the volume of water decomposed in the gas-generator per unit of time; μ , the relative volume of the gases in relation to the water which produced them; we have for the gases the following formulæ:—

$$v = \frac{l}{l' + c} \frac{s}{a} \frac{1}{(1 + \delta) p + p + f}$$

$$ar = \frac{l}{l' + c} \frac{s}{(1 + \delta)} \frac{1}{v} \frac{1}{1 + \delta} [p + f]$$

III.

$$s = \frac{l' + c}{l} a v [(1 + \delta) r + p + f]$$

$$\text{Useful effect} = ar v$$

After detonation, or sudden expansion of the volume of the gas, when detonated by an electric spark, as before mentioned, the resulting velocity will be in proportion to the square root of the impressing force or pressure.

There will necessarily be an equality between the production of gas and its expenditure. If P' be the pressure

of the gas in the cylinder, then $\frac{\mu s}{P'}$ is the volume of gas transmitted per unit of time to the cylinder. $a(l' + c)$ is the gas expended at each stroke, and if there be K strokes in a unit of time, the expense for that unit will be $K a(l' + c)$ —but the velocity per unit of time is, $v = K l$ $\therefore K = \frac{v}{l}$, and $\frac{v a(l' + c)}{l}$ is the gas expended per

unit of time—therefore $\frac{\mu s}{P'} = \frac{v a(l' + c)}{l}$ and $P' = \frac{\mu s}{v a} \frac{l}{l' + c}$

But, when detonated, the gas expands to x times its former volume, the force exerted on the piston is $x P'$, denoting by x the co-efficient of expansion, and by P' the pressure of the gas on the piston at the point l' ,

the resulting velocity is $v_u = x^{\frac{1}{2}} P^{\frac{1}{2}} = \left(\frac{x \mu s}{v a} \frac{l}{l' + c} \right)^{\frac{1}{2}}$

or, $v_u^2 = \frac{x \mu s}{v a} \frac{l}{l' + c}$. From this equation we can determine the velocity developed by the detonation of the gases at each stroke, for each unit of time it will be K times that amount.

Home Correspondence.

THE EFFECT OF PRIZES ON MANUFACTURES.

SIR,—Not having been able to attend the reading of Mr. Sidney's paper on the 23rd April, you will perhaps allow me to offer a few remarks on the very interesting topic which formed the subject of it. I must first express my surprise at seeing the question of prizes so tardily brought forward in its present shape, the point having been already long settled that there were to be prizes awarded in the forthcoming Exhibition. I cannot help regretting that Mr. Sidney, instead of condemning the system altogether, did not turn his undeniable talent to the more useful task of finding and pointing out how the defects of that system were to be remedied. His own ideas on the subject, and the remarks they would have elicited from his hearers, might then have resulted in some practical hints to the jurors who are about to commence their labours.

The main question proposed having been fully and ably discussed the other night, I shall not enter into it again, but shall merely remark that Mr. Sidney would, I think, find but few exhibitors to join him in the assertion, "that eminent English manufacturers look on the offer of prizes with contempt." The principal argument, however, and the most forcible one he makes use of against prizes, is that they were not awarded with discrimination in some instances by the jurors of 1851. Admitting this to be a fact, it arose, I believe, in a great measure, from the two following causes, viz.:—The excess of the scientific over the practical element in the formation of the juries, and the heterogeneous character of the articles often thrown into the same class. To quote an example, Class xxix. embraced nearly twenty species of manufactures, all perfectly distinct from each other, and among the twelve jurors and associates there were but two practical men; the others were very eminent men of science, but could only

have a very superficial knowledge of the various wares they had to examine. In the present Exhibition, although a little, perhaps unavoidable, confusion still exists in the classification of some of the goods, the juries are likely to contain a greater proportion of practical men, having been, through a very wise regulation, elected by the exhibitors themselves, who ought to know the most able judges of their merits. As to the objection raised to jurors being at the same time exhibitors, I do not see how this can influence their decision in any way, for the self-denial they show in renouncing all prizes, is a sufficient guarantee of the impartiality they intend to display towards their fellow exhibitors. I therefore hope that the result of the forthcoming awards will be, not to "make things pleasant" for all parties concerned, which is both undesirable and impossible, but to reward the truly deserving and stimulate improvements in manufactures, which is, or ought to be, the sole aim of Exhibition Prizes.—I remain, &c., E. RIMMEL, Juror, Class 4.
96, Strand, 26th April, 1862.

SIR,—Not having had it in my power to attend the reading of the paper by Mr. Sidney on Wednesday evening, the 23rd of April, and the very interesting discussion which followed, I beg to offer my ideas on the law of patent right, embodied in the following letter, addressed in reply to the Secretary of the Patent Law Association, inviting me to join that proposed Institution.

I am, &c., HENRY W. REVELEY.

Parkstone, Poole, Dorset, April 22nd, 1862.

SIR,—In reply to your favour of the 17th inst., I beg to state that I am sorry I cannot unite with your proposed association for the support of the present system of patent right, which seems to have been created for the special benefit of the gentlemen of the law connected therewith and the manufacturing tradesmen as an advertisement.

That the law of patent right is a species of monopoly, adverse to the interests of the consumers of patented articles and processes, by unnaturally increasing the cost thereof, is a very minor consideration.

The system of patent rights is a kind of lottery most injurious to the patentees themselves, because ninety-nine out of a hundred never derive the slightest benefit, and not one in a thousand ever realises anything like a fortune from his appeal to the patent laws.

It is impossible to prevent piracy or evasion, and the lawsuits arising thereon entail heavy expenses, from which the patentee can derive nothing but loss; and it often happens that a patent becomes useless with the addition of a rider from some other patentee, whose license must be paid for.

In the history of the patent laws two remarkable cases may be pointed out; for instance, Hobday's patent snuffers, from their extreme simplicity, were never pirated or superseded. The common fate of most patents, but it will be difficult to find a parallel case. Another is the patent taken out by Messrs Boulton and Watt for their double-acting steam-engine. In order to sustain their rights, that firm had to take out innumerable secondary patents, and stand many very heavy lawsuits in consequence of endless piracies, evasions, and infringements, at such an enormous cost that their term was ultimately extended to the period of twenty-one years. The public was in the mean time charged enormously for their engines, while the firm made but little profit, scarcely more than if they had carried on without any patent at all, until after their term had expired. The public at large would have been gainers if it had presented the sum of £100,000 to the firm in lieu of any patent right whatever.

The patent laws crush many good and useful inventions in the bud, because if the inventor be too poor or too prudent to expend his slender means in such a lottery, he either consigns his invention to oblivion, or enlists a partner in the business, for whose debts he becomes liable to the whole extent of his property, and who in many cases absorbs the whole of the profits, if any, resulting from the venture. Under the present system no invention, however useful or profitable, can be brought out unless secured by patent right.

Nine-tenths of all existing patents might, if it were worth while, be set aside, either from previous patents taken out for the same or similar objects, or previous publication, as in the case of the so called Armstrong gun, for twisted gun-barrels,

formed of spiral coils of wrought-iron, have been made time out of mind. Moreover, in this case the board of ordnance committed the error of purchasing the Armstrong patent at an enormous cost, when the board had been in possession of the identical plan in principle, which was deposited with the ordnance department unconditionally by the writer two years before the date of Sir W. Armstrong's patent. In stating that the principle is identical, that is to say the plan of forming the body of the gun by means of a spiral coil of wrought-iron or soft steel, it may be necessary to explain that the Armstrong patent does not fully carry out my intention, which is to envelope the wrought iron, unbustable tube, with a jacket of cast-iron, of sufficient weight to resist inordinate recoil, always necessarily detracting from the ultimate range of every species of projectile. It may also be observed that the general opinion at present is that the powder should not be of a character to explode too quickly, because it would then burst the gun without propelling the ball, and on that principle the powder used in the Armstrong gun is granulated nearly as coarse as coffee grains, a process diametrically opposed to the reason assigned for the granulation of gunpowder at all, as meal powder has no force.

The natural conclusion to be drawn from these premises is that the ultimate range of projectiles has not yet been practically obtained, and that the new white gunpowder, requiring no granulation, and consequently occupying much less space in the barrel, will, from its quicker ignition, obtain a far greater range with guns of sufficient strength and weight than the ordinary powder at present in use, which must of necessity be granulated.

The argument much used in favour of the patent laws, namely, that through their influence only are inventions produced, has no weight whatever, because good and useful inventions would be equally produced if such laws had never been in existence. In fact all the means and appliances of common life were originally true inventions, produced some thousands of years before the first patent right was granted in the dark and semi-barbarous ages, about the time of the reign of Queen Elizabeth.

Holding such sentiments on the subject of the patent laws, you will not be much surprised to find that I am not inclined at present to join your proposed Patent Association.

I am, &c., HENRY W. REVELEY.

To Robert Richardson, Esq.,
26, Great George-street, Westminster.

MR. WINKWORTH'S PAPER ON SILK.

SIR,—In the paper read by Mr. Winkworth on the 30th ult., and the discussion which followed, as given in the *Journal*, there are misstatements which ought, I think, to be corrected. Mr. Winkworth says that spun silk was within the last few years worth only 6d. per lb. It never was within six times that sum. Mr. Chadwick is made to say that he produced organzine silk of from 4½ to 5 deniers, but this must surely be a mistake; organzine so fine was never seen. Mr. Hawes's statement as to what Mr. Huskisson did in 1852, is evidently a misprint for a much earlier date (1826).

I am, &c.,
D. KEITH.

124, Wood-st., and 13, Goldsmith-st., Cheapside,
May 5th, 1862.

To Correspondents.

ERRATUM.—In the last number of the *Journal*, page 397, col. 1, line 19 from bottom, for "THOMAS" read "JOHN."

MEETINGS FOR THE ENSUING WEEK.

MON. R. Geographical, 8½. 1. Lieut.-Col. T. B. Collinson, R.E., "Description of the Ruins of Cassope, in Epirus, near Preirsa." 2. Mr. William Kelly, F.R.G.S., "British Columbia." 3. Commander R. C. Mayne, R.N., F.R.G.S., "Explorations in Vancouver Island."
R. Horticultural, 2.
TUES. ... Medical and Chirurgical, 8½.
Civil Engineers, 8. 1. Mr. H. C. Forde, "The Malta and Alexandria Cable." 2. Mr. C. W. Siemens, "On the Electrical tests employed during the construction of the Malta and Alexandria Telegraph, and on Insulating and Protecting Submarine Cables."
Zoological, 9.
Syro-Egyptian, 7½.

- WED. .. Society of Arts., 8. Mr. John Arthur Phillips, "On Gold Mining, and the Gold Discoveries made since 1851."
Graphic, 8.
Microscopical, 8.
Literary Fund, 3.
Archæological Assoc., 8½.
R. Geographical. President's Soirée, at Bath House, Piccadilly.
- THURS. ... Royal, 8½.
Antiquaries, 8½.
Chemical, 8.
Numismatic, 7.
Royal Society Club, 6.
- FRI. Royal Inst., 8.
Royal United Service Inst., 3. Lieut.-Col. A. Cunningham Robertson, "Military Training, considered principally with reference to the most advantageous arrangement of the daily exercises and occupations of Private Soldiers of Infantry."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

1063. J. F. Spencer, Newcastle-on-Tyne—Imp. in steam engines.
1064. H. C. Lee, 11, Lawrence Poultney-lane—Imp. in knitting machines.
1066. J. Beard, Leonard Stanley, Gloucestershire—An imp. or imps. in sofa beds or sofa bedsteads.
1067. J. M. French, Birmingham—Imp. in upright pianofortes.
1068. J. Darlington, 26, Gresham-street—Imp. in the arrangement of marine telegraph wires and cables.
1069. J. K. Hampshire, Whittington, Derby—A safety cage with dis-connecting catch to prevent accidents in the working of coal and other mines arising from the over winding or breaking of the ropes or other parts used for hoisting purposes.
1071. C. Harratt, Hornsey-lane, Highgate—Imp. in the manufacture of masts, yards, and booms.
1073. R. A. Brooman, 166, Fleet-street—Imp. in reaping and mowing machines. (A com.)
1075. R. A. Brooman, 166, Fleet-street—Imp. in pumps. (A com.)
1076. R. A. Brooman, 166, Fleet-street—Improved hobby horse. (A com.)
- [From Gazette, May 2nd, 1862.]
- Dated 11th February, 1862.
360. G. Lindemann, Manchester—Imp. in applying gas for the purpose of singeing yarns or threads and woven fabrics, and for obtaining heat for other purposes.
- Dated 20th February, 1862.
451. E. M. Stoebr, Manchester—Imp. in the manufacture of manganese, and in the combinations of manganese with other metals. (A com.)
- Dated 14th March, 1862.
710. W. Turner, 39, Hockley, Nottingham—Imp. in the construction of bakers' ovens, and in the use of furnaces and other apparatus connected therewith, and in the means or appliances employed therein.
- Dated 15th March, 1862.
714. C. N. Kottula, Belle-isle—Imp. in the manufacture of combined soaps.
- Dated 17th March, 1862.
729. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the manufacture of crinolines. (A com.)
- Dated 31st March, 1862.
901. J. M. Clements, Birmingham—Certain imp. in sewing machines for performing the various kinds of work necessary in stitching, button and eyelet-hole working, embroidering, and sewing generally.
- Dated 1st April, 1862.
911. W. Turner, 39, Hockley, Nottingham—Imp. in machinery or apparatus employed in the manufacture of dough, and especially of fermented dough.
- Dated 3rd April, 1862.
938. W. Helme, Caldbeck, Cumberland—Imp. in firelighters.
939. R. Morton, Stockton-on-Tees—Imp. in refrigerators or apparatus for cooling liquids, parts of which imp. are also applicable to distillation, surface condensation, heating air for blast furnaces, and other similar purposes.
- Dated 4th April, 1862.
956. T. Silver, 20, Bury-street, St. James's—Imp. in governors for regulating the speed of steam and other engines.
- Dated 9th April, 1862.
1010. J. Bullough and J. Bullough, Baxenden, near Accrington—Imp. in looms for weaving.
- Dated 10th April, 1862.
1021. D. Fryer, Carlton-square, Old Kent-road, and W. J. Williams, Arundel-street, Strand—Imp. in the method of and apparatus for letting on and cutting off the supply of gas to groups or districts of street and other lamps from a central point or depot.
1038. A. Trimen, 9, Adam-street, Adelphi—The protection and solidification of magnesium limestone and other stones, and for the prevention of the passage of water through the same.

Dated 12th April, 1862.

1054. J. Bunnett, Deptford, Kent—Imp. in revolving shutters, and in machinery for producing the same.

Dated 14th April, 1862.

1070. J. Dargue, 63, Cobden-street, Lister-hills, Bradford—Imp. in machinery for preparing and combing wool and other fibrous materials.

Dated 15th April, 1862.

1079. J. Taylor, Lyon Mill, Oldham—Imp. in machinery or apparatus for preparing cotton and other fibrous materials to be spun.
1080. T. H. Bennett, Winchester-house, Southwark—Imp. in the manufacture of hats, caps, or other coverings for the head.
1081. Col. F. A. Le Mat, New Orleans, U.S., and C. F. Girard, Washington, U.S.—Imp. in the construction of revolving and repeating fire-arms, part of which invention is also applicable to other arms.
1082. Lieut. R. Roche, R.N., Southsea, Hants—An imp. in gun carriages.
1083. C. R. Heap, Great George-street, Westminster—An improved construction of railway chair. (A com.)
1085. G. Bedson, Manchester—Imp. in the manufacture of wire ropes, and in the preparation of wire for such manufacture.
1086. J. Platt, Oldham, and W. Cheetham, Moscow, Russia—Imp. in looms for weaving.
1087. J. Platt and W. Richardson, Oldham—Imp. in machinery or apparatus for cleaning wool and other hairs of animals from burrs and other foreign matters.
1088. R. A. Peacock, St. Helier, Jersey—Imp. in constructing and working lock gates for docks, harbours, canals, and navigable rivers.
1089. W. Clark, 53, Chancery-lane—Imp. in ornamenting fabrics and other surfaces. (A com.)
1091. F. C. Phillipson, Munzstrasse, Berlin—Imp. in steam hammers. (A com.)
1092. J. Crossdale, 2, Rotherfield-street, Islington—Certain imp. in boots and shoes for ventilating same.
1093. R. Rains, 4, Crescent, Bridge-street, Blackfriars—Imp. in apparatus for freezing, cooling, and churning. (A com.)
- Dated 16th April, 1862.
1094. S. Barrett, 8, Clifton-street, Finsbury—Imp. in projectiles.
1095. F. N. Gisborne, 3, Adelaide-place, London-bridge—Imp. in the construction of electric targets for rifle and gun practice.
1097. J. Barbour, Liverpool—Imp. applicable to upholsterers' and other hand hammers. (A com.)
1098. W. F. Lock, Haylands, near Ryde, Isle of Wight—An elongated projectile to be shot from smooth bored ordnance, and which shall retain during its flight the longer axis in the direction of its line of flight similarly to elongated projectiles propelled from rifled ordnance.
1099. J. W. Hadwen, Kebroyd Mills, Halifax—Imp. in the treatment and application of soft silk waste.
1100. D. Stott, Stainland, Yorkshire—Imp. in the manufacture of rings from paper, millboard, or pasteboard applicable for steam or other pipe joints, bobbin ends, and other purposes, and in the means or apparatus employed therein, which are also applicable to the manufacture of rings from other flexible substances.
1101. J. Mackay, Liverpool—Certain imp. in projectiles for fire arms.
1102. J. M. Rowan, Glasgow—Imp. in manufacturing articles of cast steel.
1103. R. Cochran and R. Cochran, jun., Paisley—Imp. in producing ornamental fabrics.
1104. F. P. Warren, East Court, Cosham, Hants.—Imp. in apparatus for steering sea-going vessels.
1105. M. Cartwright, St. John's-row, Hoxton—Imp. in the manufacture of models, and of plates or pieces for artificial teeth, and in combining or amalgamating india-rubber and gutta percha with metals for the manufacture of artificial plates or pieces, and for other purposes.
1106. W. J. Marsden, Sheffield—Imp. in eye-shades.
1107. W. E. Newton, 66, Chancery-lane—An imp. in setting artificial teeth. (A com.)
1108. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of cannon and other ordnance, and of solid and hollow cylinders for shafting and other purposes of wrought iron or steel, or both combined. (A com.)
1109. John Stanton, Birmingham—Imp. in apparatus or machinery to be used in stamping or piercing metal washers and other similar articles.
1111. J. Ashbury, Manchester—Imp. in the permanent way of railways.
1112. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in railway and common road carriages. (A com.)
1113. J. W. Ford, Shooter's-hill, Kent—Imp. in sewing machines. (A com.)
1114. J. Weston, 80, Upper Whitecross-street, St. Luke's—Imp. in machinery for morticing, drilling, and dove tailing, and in tools to be used therewith.
- Dated 17th April, 1862.
1115. C. D. Abel, 20, Southampton-buildings, Chancery-lane—Imp. in the manufacture and production of the chromates and the bichromates of potash and soda. (A com.)
1117. V. Fleury, 23, Rue de la Paix, Paris—Imp. in clocks and other time keepers.
1118. W. H. Hutchinson, Bury—Imp. in the manufacture of ammonia or its salts, and cyanogen or its compounds, from refuse gluten.

1119. J. Griffiths, Liverpool—Imp. in propelling ships and other navigable vessels.
1120. W. Harling, M. Todd, and T. Harling, Burnley—Imp. in looms for weaving.
1121. F. Tolhausen, 17, Faubourg Montmartre, Paris—An improved machine for making bricks, tiles, and the like articles. (A com.)
1122. J. Murphy, sen., Glasgow—Imp. in looms.
1123. J. P. Temperley, Soho Iron Works, Bolton-le-Moors—Imp. in the air pumps of steam engines.
1125. J. L. Perin, 97, Rue du Faubourg St. Antoine, Paris—Imp. in machinery for mortising wood.
1126. H. Gardner, Leeds—Imp. in machinery for breaking and preparing flax and other fibrous substances.
1127. C. D. Abel, 20, Southampton-buildings, Chancery-lane—Imp. in the manufacture and production of certain alloys containing cadmium. (A com.)
1128. R. A. Brooman, 163, Fleet-street—Imp. in taps and valves. (A com.)
1129. R. A. Brooman, 166, Fleet-street—Imp. in buffing apparatus, and in draw springs. (A com.)
1130. W. Anderson, 85, Shaftesbury-street—Imp. in tubular steam generators.
1133. W. Clark, 23, Chancery-lane—Imp. in the manufacture of railway rails. (A com.)
1134. J. C. Rivett, Prestolee New Mills, Farnworth, Lancashire, and J. M. Hetherington, Manchester—Imp. in machinery or apparatus for preparing cotton and other fibrous materials for spinning.
1135. R. Wedgwood, Barnes, Surrey—Improved apparatus for facilitating the saving of life in cases of fire.
- Dated 19th April, 1862.*
1136. R. Dennison, Lancaster—Imp. in reaping and mowing machines.
1137. E. Dove, Hunter-street—Imp. in matches and fuzes, and apparatus for containing and igniting the same.
1138. Major J. S. Phillips, 10, College-crescent, Finchley-road—A new method and apparatus for the propulsion of vessels through the water.
1139. J. Shanks, Barrhead, Renfrew, N.B.—Imp. in apparatus for promoting ventilation, also applicable to drying stoves.
1140. M. Masters, New Kent-road—Imp. in artificial legs.
1141. R. Stuart, G. Stuart, and H. Hill, Sheffield—Imp. in fastening flyers upon spindles.
1142. B. Rhodes, Old Ford-road, Bow—Imp. in the machinery for, and in the method of making, as also in the materials to be employed in the manufacture of, cylinders, tubes, and other vessels from paper and other materials or fabrics.
1144. B. Browne, 82, King William-street—Imp. in breech-loading fire arms. (A com.)
1145. E. Loysell, Cannon-street—Imp. in locks and fastenings.
1146. W. Rose, Hales Owen, Worcestershire—Imp. in the manufacture of tubes, more especially applicable to the barrels of fire-arms and ordnance.
1147. A. Parkes, Liverpool-street, Birmingham—Imp. in the manufacture of rollers for surface printing and embossing.
1148. A. N. Wornum, Store-street—Imp. in pianofortes.
1150. H. Lumley, Chancery-lane—An improved rudder.
- Dated 21st April, 1862.*
1154. J. Pickard and T. Morris, Preston—Imp. in furnaces for the prevention or consumption of smoke.
1156. S. F. Griffin, New Adelphi-chambers—Imp. in the construction of vessels of war and batteries on land.
1158. E. F. Clarke, Waterloo, near Liverpool—Imp. in propellers for steam ships and other vessels.
1159. R. A. Brooman, 166, Fleet-street—Imp. in jackets or protectors for covering metal and other surfaces to prevent heat by radiation. (A com.)
1160. F. Tolhausen, 100, Fleet-street—An imp. in horse-shoes. (A com.)
1161. T. Attwood, Lewes—Imp. in kitcheners.
1164. J. C. Amos, The Grove, Southwark—An improved mode of, and imp. in apparatus for, supplying surface condensers with water, part of which improvements are applicable to blowers and rotary pumps generally.
1165. C. C. Creeke, Bournemouth, Hants—Imp. in the construction of drain and other pipes.
- Dated 22nd April, 1862.*
1170. C. Webster, Park-steps, Ilkeston-road, Radford, Nottinghamshire—Imp. in self-acting fountains adapted for garden engines, fire engines, and for raising and forcing water from mines, wells, and other places.
1171. A. Warner, Threadneedle-street—Imp. in the construction of vessels of war, and in floating or other batteries.
1172. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for propelling and manœuvring ships. (A com.)
1173. G. Scoville, Wood's Hotel, Furnival's-inn—Imp. in pistons for steam-engines. (A com.)
1174. R. Boby, Bury St. Edmunds—Imp. in the construction of apparatus for rolling or crushing land.
- Dated 23rd April, 1862.*
1176. L. Holden, Burnley—Certain imp. in harness for animals of draught and burden.
1180. W. Carpenter, Greenwich—An improved method of printing in colours.
1182. A. Robertson, 22, Bachelor's-walk, Dublin, and R. Barter, St. Annes, Blarney, Cork—Imp. in apparatus for distributing and projecting fluids, either for surgical, sanatory, or domestic purposes.
1186. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the construction of elliptic springs for wheel carriages and other purposes. (A com.)
1188. W. E. Newton, 66, Chancery-lane—An improved fertilizing composition.
1190. C. E. Heinke, 79, Great Portland-street—Imp. in diving helmets, dresses, and apparatus, parts of which imp. may also be employed for extinguishing fires in ships and other confined places.
- PATENTS SEALED.**
[From Gazette, May 2nd, 1862.]
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| <p style="text-align: center;"><i>May 2nd.</i></p> <p>2775. W. Hall.</p> <p>2777. R. Fethney.</p> <p>2779. E. Bowra.</p> <p>2780. J. B. Love.</p> <p>2783. H. Orth.</p> <p>2787. A. Prince.</p> <p>2789. F. H. Schroder.</p> <p>2794. A. W. Williamson.</p> <p>2799. J. Hancock.</p> <p>2816. S. Hague.</p> <p>2817. J. Fisher.</p> <p>2844. L. F. Duval and L. A. Beaudet.</p> <p>2845. M. Henry.</p> | <p>2848. J. Hodgkinson & D. Green-halgh.</p> <p>2854. T. Procter.</p> <p>2875. J. Nixon.</p> <p>2883. J. C. Goodall and J. Beale.</p> <p>2902. J. Hemingway.</p> <p>2945. J. H. Johnson.</p> <p>2990. W. Clark.</p> <p>3029. J. Burrows and J. Dougan.</p> <p>3127. E. C. B. Beaulieu.</p> <p>3142. E. C. B. Beaulieu.</p> <p>355. W. Lyall.</p> <p>405. W. Avery.</p> <p>509. J. Imray.</p> |
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- [From Gazette, May 6th, 1862.]*
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| <p style="text-align: center;"><i>May 6th.</i></p> <p>2797. T. Schwartz.</p> <p>2798. H. G. Gibson.</p> <p>2801. J. Barrow.</p> <p>2809. J. Byrne.</p> <p>2811. D. Cowan.</p> <p>2813. G. Simpson.</p> <p>2814. R. McNair.</p> <p>2819. R. A. Brooman.</p> <p>2825. F. O'Reilly.</p> <p>2827. D. Y. Stewart.</p> | <p>2833. C. O. Crosby.</p> <p>2847. T. B. Collingwood and A. Butterworth.</p> <p>2851. E. C. Kemp.</p> <p>2928. W. E. Newton.</p> <p>2989. A. V. Newton.</p> <p>3222. T. E. Vickers.</p> <p>528. E. G. Bruzard.</p> <p>567. J. B. Kendall.</p> <p>583. H. Bunning.</p> <p>587. B. Standen.</p> |
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- PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.**
[From Gazette, May 6th, 1862.]
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| <p style="text-align: center;"><i>April 28th.</i></p> <p>1067. R. Harrington.</p> <p>1090. C. H. G. Williams.</p> <p>1111. L. R. Blake.</p> <p style="text-align: center;"><i>April 29th.</i></p> <p>1075. W. M. Cranston.</p> <p>1083. J. Toussaint.</p> <p>1085. E. Francis.</p> <p>1182. H. Clarke.</p> <p style="text-align: center;"><i>April 30th.</i></p> <p>1092. T. H. Harrowsmith.</p> | <p style="text-align: center;"><i>May 2nd.</i></p> <p>1109. W. Sellers.</p> <p>1095. W. Bayliss.</p> <p>1106. T. W. Miller.</p> <p>1115. R. Mushet.</p> <p>1123. J. F. Allender and D. Rowley.</p> <p style="text-align: center;"><i>May 3rd.</i></p> <p>1150. R. Mushet.</p> <p>1151. R. Mushet.</p> <p>1173. G. Bell.</p> |
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- PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.**
[From Gazette, May 6th, 1862.]
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| <p style="text-align: center;"><i>April 28th.</i></p> <p>975. W. Hartley.</p> <p style="text-align: center;"><i>April 30th.</i></p> <p>986. H. Lee and J. Gilbert.</p> | <p style="text-align: center;"><i>May 2nd.</i></p> <p>988. M. A. C. Mellier.</p> |
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LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4474	May 5.	{ The Blanchard Port-Cartouche, or Com- bined Rifle Ball and Powder Holder.	William Harnett Blanch	Liverpool.
4475	" 6.	An Improved Trunk	{ Jas. Tasman (of the firm of Tasman and Co. ... James Lamb ...	11, Grocer's-hall-court, Poultry, E.C. 37, Furnival-st., Sheffield, Yorkshire.
4476	" "	Clasp or Clip for Crinolines...	and Harry Holdsworth and Co...	{ Spring Works, New George-street, Sheffield, Yorkshire.

Journal of the Society of Arts.

FRIDAY, MAY 16, 1862.

CONVERSAZIONI.

The second and third Conversazioni of the present season will be held at the South Kensington Museum, on the 9th of July and the 8th of October.

INTERNATIONAL EXHIBITION of 1862.
SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £451,100, have been attached to the Deed.

TWENTIETH ORDINARY MEETING.

WEDNESDAY, MAY 14TH, 1862.

The Twentieth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 14th inst., Thomas Sopwith, Esq., F.R.S., Member of the Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Chapman, David Ward ..	{ Totness-park, Sunningdale, Berks.
Clabon, John Moxon.....	21, St. George-street, S.W.
Cowper, Samuel T.....	Leeds Iron Works.
De Vandoni, Gen. Count.	{ 45, Manchester-street, Manchester-square, W.
Dobson, J. T.....	Hull.
Fleming, George	22, St. James's-street, S.W.
Fox, Thomas	{ Lordship-lane, Tottenham, N., and 93, Bishopsgate-st., E.C.
Gardener, Chas. Henry...	{ West Harding-street, Fetter-lane, E.C.
Hall, Collinson ..	Navestock Hall, Essex.
Hall, Ralph	Manchester.
Hannay, John	Springfield, Ulverston.
Knight, J. G.....	{ Secretary to the Victoria Commission of the International Exhibition of 1862.
Low, Sampson, sen.	47, Ludgate-hill, E.C.
Marshall, J., M.D. ...	Queen's-rd., Up. Norwood, S.
Maule, George	1, Kennington-road, S.
Neilson, Walter.....	172, West George-st., Glasgow.

Overend, James.....	47, Parliament-street, S.W.
Pearson, Z. C.....	{ 34, Great St. Helen's, E.C., and Hull.
Rodoconachi, M. E.	{ 3, Gloucester-square, Hyde-park, W.
Ryley, Edward Chas. ...	{ 16, Gt. Prescott-street, Goodman's-fields, E.
Sharman, Edward Alfred.	{ 2, Heathcote-street, Mecklenburgh-square, W.C.
Shaw, George.....	9, King Edward-street, E.C.
Siebe, Daniel	17, Mason-street, Lambeth, S.
Spence, Joseph	22, St. James's-street, S.W.
Summerscales, John	Keighley, Yorks.
Taylor, George	Clarence Iron Works, Leeds.
Traer, J. R., F.R.C.S. ...	{ 47, Hans-place, Sloane-street, S.W.
Ward, Reginald.....	{ 20, Albion-road, St. John's-wood, N.W.
Weston, Joseph D.	{ Stanhope-villa, White Ladies'-road, Clifton, Bristol.
Wickens, H.	{ 112, Camden-rd.-villas, N.W., & 4, Tokenhouse-yard, E.C.
Young, William Joseph..	Roker, Sunderland.

AND AS HONORARY CORRESPONDING MEMBER.

Kaznadar, The General Mustapha	{ First Minister and Minister for Foreign Affairs to the Bey of Tunis.
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The following candidates were balloted for and duly elected members of the Society:—

Anketell, Wm. Robert ...	West-hill, Harrow, N.W.
Billinge, James	Ashton, Lancashire.
Dalrymple, James	{ Langlee-house, Galashiels, N.B.
Du Pré, Caledon George, M.P.	40, Portland-place, W.
Gurney, James	{ 67, Addison road, Kensington, W.
Heinke, W.....	{ 79, Great Portland-street, Portland-place, W.
Irving, John	94, Eaton-place, S.W.
Moore, John	{ 104, Bishopsgate-st.-within, E.C.
Newhouse, Titus	{ 10, Douglas-road, Canonbury, N.
Painter, Thomas	Wrexham.
Petherick, Horace William	{ 2, Rosa-villas, Lillie-road, St. John's, Fulham, S.W.
Plumptre, Chas. John ...	{ 1, Essex-court, Temple, E.C., and 26, Elgin-road, Kensington-park-gardens, W.
Preller, E.	Bradford, Yorks.
Steele, Andrew	33, Great George-st., S.W.
Tarring, John.....	26, Bucklersbury, E.C.
Walsh, Edward	{ 10, Darnley-road, Royal-crescent, Notting-hill, W.
Ward, Henry	{ 100, Great Russell-street, Bloomsbury, W.C.

The Paper read was—

GOLD MINING AND THE GOLD DISCOVERIES
MADE SINCE 1851.

BY JOHN ARTHUR PHILLIPS.

It would be obviously impossible to attempt to give, within the limits of the present paper, a detailed account of all the valuable gold discoveries which have been made within the last ten years, and I shall therefore necessarily confine myself to the more important only, but shall at the same time briefly notice various modifications which experience has introduced into the processes for treating auriferous ores, and succinctly advert to some of the causes which have unfavourably influenced this class of industry.

Gold is usually found in a quartzose gangue, traversing altered palæozoic shales, and these deposits are frequently

richest in the vicinity of eruptive rocks. The oldest stratified rocks have been seldom found auriferous, but the sedimentary deposits which follow in the series (*i.e.*, those generally ascribed to the Silurian, Devonian, and Carboniferous epochs,) have, particularly when highly metamorphosed, yielded the largest amounts. Of these, those usually described as Silurian rocks have been by far the most productive, but instances are not wanting, even in Europe, of small quantities of the precious metal having been found in the conglomerates of the Carboniferous period.

Gold almost always, if not always, occurs in the native or metallic state; generally in the form of small flakes or granules, but occasionally in masses of considerable weight. It is never pure, being invariably alloyed with silver, and frequently contains small proportions of iron and copper.

Gold is also often associated with various metallic sulphides, such as copper pyrites, galena, blende, and particularly with iron pyrites and mispickel. It appears somewhat doubtful whether, in every instance, all the gold in metallic sulphides exists in the form of minute metallic particles, or if, in some cases at least, it may not be present in combination with sulphur. I may however observe, that from the results of numerous experiments on this subject, I am inclined to the belief that gold does sometimes occur in small quantities in the form of sulphide, but that oxide of gold, for the extraction and utilization of which sundry much vaunted processes have been devised, does not exist in any of the known auriferous ores.

The extraction of gold from the sulphides would, by the ordinary process of amalgamation, present considerable difficulty, and consequently it will often be found advantageous to separate and collect the pyrites, &c., contained in the tailings, and subsequently to subject them to metallurgic treatment by fusion either with galena, litharge, or some other lead product.

The most important gold discoveries made during the last ten years are those of British Columbia, New Zealand, and Nova Scotia; but it may also be observed, that gold in paying quantities has been recently discovered in the neighbourhood of Dolgelly, in North Wales.

BRITISH COLUMBIA.—As early as June, 1856, Mr. Douglas, the Governor of Vancouver's Island, reported to the Secretary of State the discovery of gold in the British territory, north of the 49° of latitude, and stated that the earnings of the diggers ranged from £2 to £8 a day. In consequence, however, of the hostile attitude assumed by the natives, the number of diggers was very limited. Altogether this discovery attracted at first less attention than might have been anticipated, but in December, 1857, Governor Douglas reported that the Indians themselves were extensively engaged in the search for gold, and that the accounts which had reached the neighbouring states of America had caused considerable excitement. It was not, however, until May, 1858, that a stream of immigration sufficient to overpower the opposition of the aborigines had fairly set in, and the British public learnt, for the first time, that the mainland of new Caledonia, as the district extending from the Red-river to the Pacific was somewhat vaguely designated, was a rich and beautiful land, which gave every promise of becoming a flourishing and highly important colony.

The *Times* correspondent, writing from Victoria, Vancouver's Island, under date of January 20th of the present year, says:—"Beginning with Fraser River, the main artery of the auriferous region, I may state that gold is known to exist, and has been worked at a great many places in the river and on its banks, from a point about 45 miles from its mouth up to near its source in the Rocky Mountains; in other words, from the 49th up to the 53rd parallel of north latitude, a distance (taking in the windings) of some 800 miles. The south branch of the Fraser has its sources near Mount Brown, in the Rocky Mountains, in about 53° north latitude, 118° 40' m. west longi-

tude. Thence this branch flows for 290 miles to Fort George, a post of the Hudson's Bay Company. The north branch rises in an opposite direction. It receives its supply from a series of lakes lying between 54° and 55° of north latitude; longitude about 124° 50' m. west, and runs a course of 260 miles to its junction with the south branch, some miles below the 54th parallel of north latitude. Here the union of the two branches forms the Fraser River proper. Adding the north branch, which is also a gold-bearing stream, and which was worked last season, to the other arm, the two will give us a continuous stretch of auriferous riverain territory upwards of 1,000 miles in length, extending for many miles back into the country, but not including the tributary rivers which fall into the Fraser. In short, the river itself is now known to be auriferous, and to pass through a gold-bearing country throughout its whole course. Gold is also found in most of the tributaries of the Fraser, of which no less than 59 are known. The great length of the main river, and the number of its tributaries, will give some idea of the auriferous resources of the country.

"But these facts do not by any means convey a comprehensive or accurate view of the vast extent of the area of the goldfield, because they are limited to the central portions of the country, while the whole of the upper portion of British Columbia, from its southern to its northern boundary, is auriferous.

"Besides the gold found in the beds and on the shores of these streams, the Fraser itself and many of its tributaries are skirted and bordered by terraces, all of which yield gold also. These terraces, or benches, as the miners call them, run at intervals along both sides of the rivers for miles in length, and they recede where the mountains retire for distances back into the valleys varying from a few acres to a few miles in breadth. They are objects of curiosity and speculation, and add much to the beauty of the rude scenes in which they occur, from the regularity and evenness of their structure. They generally occur on both sides of the river (opposite to each other) at the same place, sometimes at the same elevation on both sides, sometimes at different elevations, high on this and low on the other side of the river, and in some places they are multiplied into several successive level parallel plateaux, rising one above the other as they recede from the bank. These terraces are composed of the ordinary alluvial deposits, loam, gravel, stones, sand, and boulders, and they are thick masses rising generally to a height of 150 to 200 feet."

From the statement of the same writer, there would also appear to be abundance of gold found in other localities besides the vicinity of the Fraser. Large yields have been obtained from the diggings between Fort Hope and Fort George, about 100 miles from its mouth. These mines are said to have yielded during the last season an average of 17 dols. to the hand, and a party of three men took from three days' diggings 240 dols. At Okanagan, sixty miles distant, the average produce is stated to have been 4 dols. to the hand. The Thompson River and its tributaries had also proved highly auriferous. North River gave from 8 dols. to 10 dols. to the hand, and on the Barrière a community of French Canadians made each as high as 50 dols. per diem.

Cariboo, however, appears to be the largest and richest of all the gold districts hitherto discovered. In confirmation of this, it may be stated that at Steele's claim, Williams's Creek (Cariboo), a company of five partners commenced their operations during the summer months. They began their preparations by sawing timber for their sluices, and at first their claim did not promise as much as many others. During the first three days they obtained little or nothing, but on the fourth day their labours were rewarded by the collection of 4 ozs. of gold. On the fifth day they made 10 ozs., and on the sixth 41 ozs. From that time the yield went on increasing until it reached 387 ozs. a day, whilst the last day's work gave a return amounting to 469 oz. The five partners employed four hands to assist

them in clearing away the tailings. The labourers were paid 8 dols. per day each, in addition to their board, and the total value of the gold raised during not more than two months' actual work was equal to a money value of £21,875. The total area of the claim so worked was 80 feet by 25 feet, thus showing the extreme richness of some of the deposits of British Columbia. I cannot, however, refrain from remarking on one of the inferences that might be drawn from the statement of the *Times* correspondent. He would appear to imply that the gold fields of British Columbia afford all prizes and no blanks.

This is, I confess, a somewhat different conclusion from that at which I should myself arrive, after considerable experience in some of the most important gold districts. We generally hear a great deal about the prizes, while little or nothing is said of the blanks; and I certainly entertain considerable doubt as to whether the glowing accounts which from time to time reach this country through the medium of the newspapers, are at all times to be relied on. Of one fact, however, I am quite certain, and that is—that I was some years since acquainted with the correspondent of one of our leading journals, who, having taken up his residence in the part of the country in which I was then living, made a large fortune by land speculations, which were in no small degree fostered by means of the articles appearing in that paper.

I would not of course impute anything like wilful misrepresentation to the resident correspondent, but it is evidently difficult to take a dispassionate view of facts and circumstances around us when our material interests are deeply involved in favour of a foregone conclusion.

There can, however, no longer be any doubt but that gold-fields of extraordinary richness, and as far as the alluvial washings are concerned, easily worked, exist in almost all parts of the colony, and also that water is plentiful; and I merely throw out these remarks for the benefit of those who, from reading the letters in the *Times*, may be induced to believe that a large fortune is to be made out of mere existence in British Columbia. Let those who go out be determined to get their own living by the exercise of industry and the strength of their own arms, and they may rest assured that an honourable independence may be realised in the colonies with much greater facility and certainty than in any European country.

NEW ZEALAND.—Early in the present year, accounts reached this country of gold discoveries having been made in New Zealand, and although, as far as I am aware, no very detailed reports of the method of its occurrence have yet been received, there is every reason to believe that remunerative deposits of the precious metal have been found in this colony. A letter, published in the *Daily Telegraph* in March last, states that:—

“The great influx of gold into Dunedin, from the Otago gold-fields, still continues. On the 22nd and 28th of November, and on the 15th of December last, the escorts conveyed respectively 21,000, 15,000, and 14,000 ozs. The total amount of gold brought down by escort, up to the 20th December, is 191,831 ozs., which, at £3 17s. per ounce, is of the value of about £738,550. This is independent of what has arrived here through private hands. New diggings are continually being discovered in the locality.”

It also goes on to say that, “It will not be long before New Zealand will be recognised as a gold-bearing country, for it is known that the whole of its mountain ranges are auriferous, from the south to the extreme point of the north.”

Also, the *Otago Daily Times*, of the 17th February, has the following remarks on the rapid progress of that settlement, consequent upon the discovery of gold-fields in the immediate vicinity:—“The population of Otago is on the increase, and the gold-fields continue to prove very productive to the number of miners engaged in working them. Every day tends to prove that gold exists in payable quantities over a large portion of the province, and that

gold mining will continue to form a profitable pursuit to a large population for many years to come. The most noticeable event during the last month has been the discovery of a new gold-field on the Lanmerlaw Creek, near its junction with the Waipori. Opinions respecting it are more or less conflicting, but the general belief is that it will prove a valuable addition to the already opened gold-fields.”

I am not in possession, however, of any special information relative to this colony, and shall consequently pass on to notice the gold-fields of Nova Scotia, which I have recently visited, and with which I am, therefore, better acquainted.

NOVA SCOTIA.—The whole of the Atlantic shore of the province of Nova Scotia is bordered, in an unbroken line, by strata of a metamorphic character, and probably of great geological antiquity, frequently broken through by eruptive rocks. These form a coast in some places low and rugged, and in others boldly undulating; their soil is generally rocky and sterile, although there are large tracts well covered with timber, and affording prosperous agricultural settlements. Along the Atlantic shore this district is generally low, gradually rising to a height of some three hundred feet as it advances northward. Its coast line has, according to Dr. Dawson, a general direction of south 68° west, whilst its inland boundary, although presenting some considerable undulations, has a direction of south 80° west. The extreme breadth of this band at Cape Canseau, its northern extremity, is about eight miles, whilst in its extension westward it gradually increases until, at the west branch of St. Mary's River, eighty miles west of Cape Canseau, it is known to be thirty miles wide. In the western counties, its width has not yet been accurately ascertained, but here its entire breadth cannot be far short of fifty miles. Its total length corresponds with that of the peninsula of Nova Scotia.

This band, in which almost the whole of the gold discovered has been found, chiefly consists of thick bands of slate and quartzite highly inclined, and having a general north-east and south-west strike. In different localities these rocks, which probably belong to the Silurian epoch, have been penetrated by masses of granite, and in their vicinity the quartzites and clay slates usually present a highly metamorphosed appearance.

Since the gold discoveries in California and Australia have been generally known, and public attention has been directed to the conditions under which deposits of the precious metal usually occur, reports of similar discoveries have from time to time locally arisen in different parts of Nova Scotia. In every instance, however, either mica or iron pyrites would appear to have been mistaken for gold. Some years since, also, a considerable amount of excitement was caused by an article in *Blackwood's Magazine*, in which it was affirmed that gold would be found in the hills to the south of Annapolis, and comparisons were instituted between that locality and the Valley of the Sacramento. Many persons were induced, by this article, to leave their ordinary occupations to seek for gold, but their researches having in all cases proved unsuccessful, the fever gradually subsided, and the subject was ultimately forgotten. It is also worthy of remark that Dr. Dawson, so long ago as 1855, when describing the great metamorphic band, observes:—“Quartz veins occur abundantly in many parts of this district, and it would not be wonderful if some of them should be found to be auriferous.”

There is nevertheless no authentic evidence of the discovery of the precious metal in the province previous to 1860, when some hundreds of persons, tempted by rumours of gold having been found, commenced exploring near the head waters of the Tangier River. The amount of gold obtained in this locality was, however, so small, that the miners ultimately became discouraged, and the excitement gradually subsided. In the month of March, last year, a man who was stooping to drink at a brook, observed a piece of gold among the pebbles at the bottom, and having

picked it up, searched and found more. This took place about a mile to the east of the Tangier River.

From this date attention became directed to the locality, numerous claims were taken up, and considerable quantities of gold were obtained by breaking the quartz with hammers, and washing the resulting dust in tin pans.

In June, the discovery of gold was reported at Lunenburg, at a locality called the "Ovens." The veins at this place, although generally small, are frequently highly auriferous, and appear to cross each other in almost all directions, in a metamorphic shale belonging to the great southern band. On these discoveries being made known, numerous claims were immediately taken up, and various companies formed for working the veins presenting themselves numerously in the cliff.

Shortly after the discovery of the auriferous nature of the quartz veins, it was found that the sands on the beach beneath the headland also contained large quantities of gold; here claims were likewise rapidly staked off and worked by means of cradles, so that the aggregate daily yield, from the several shore operations, soon reached one hundred ounces.

Gold discoveries subsequently followed each other in rapid succession, at Lawrence-town, Dartmouth, and Sheet, and Isaac's Harbours, Sherbrooke, and Laidlaw's farm.

The most remarkable deposit of auriferous quartz hitherto found in Nova Scotia is undoubtedly that at Laidlaw's farm. The principal workings are here situated near the summit of a hill composed of hard metamorphic shales, where openings have been made to the depth of some four or five feet upon a nearly horizontal bed of corrugated quartz of from eight to ten inches in thickness. This auriferous deposit is entirely different from anything I had before seen, and when laid open presents the appearance of trees or logs of wood laid together side by side after the manner of an American corduroy road.

From this circumstance the miners have applied the name of "barrel quartz" to the formation, which, in many cases, presents an appearance not unlike a series of small casks laid together side by side and end to end.

The diagram on the wall will serve to explain the mode of occurrence of this deposit.

The rock covering this remarkable horizontal vein is exceedingly hard, but beneath it for some little distance it is softer and somewhat more fissile. The quartz is itself foliated parallel to the lines of curvature, and exhibits a tendency to break in accordance with these striae.

The headings, and particularly the upper surfaces of the corrugations, are generally covered by a thin barklike coating of brown oxide of iron, which is seen frequently to enclose numerous particles of coarse gold, and the quartz in the vicinity of this oxide of iron is itself often highly auriferous.

The other gold veins of the province present, generally speaking, few distinctive peculiarities, and very closely resemble those found in California and Australia. Their general course is north 60° west, and their dip towards the south, but there are not unfrequent exceptions to this rule.

In addition to gold, the most auriferous veins of Nova Scotia contain variable quantities of iron-pyrites, mispickel, galena, blende, and less frequently a small proportion of argenteiferous and auriferous sulphide of copper. Here, as elsewhere, the presence of the sulphides is regarded as a favourable indication of the richness of a vein, and leads containing much disseminated galena almost invariably yield a remunerative quantity of gold.

The productive veins hitherto discovered have, as before stated, been found in the older rocks on the Atlantic shore, and commonly occur in parallel groups, near the centre of which, and parallel to the productive veins, a large reef of crystallized and comparatively unproductive quartz is in many instances found to run. These large courses are locally called "bull veins," and usually contain small quantities only of the precious metal.

The attention of the Nova Scotian goldminers has,

contrary to the usual practice, been almost entirely directed to the exploration of the veins of gold quartz, and alluvial digging has consequently been all but entirely neglected. There is, however, every reason to believe that a careful examination of the alluvial deposits would lead to the discovery of large quantities of gold.

It would be impossible to form any reliable estimate of the total amount of gold which has hitherto resulted from mining operations in Nova Scotia, as the claims are for the most part worked by private individuals who are generally indisposed to furnish information either as to their success or failure, and no official returns on the subject have as yet appeared. It is manifest, however, from the characteristics of the localities in which the precious metal has already been discovered, and the great extent of the gold-bearing portions of the province, that there is every reason to anticipate that further and more important results will be developed by the workings and explorations of the present summer, and that, ere long, Nova Scotia will take an important position among gold-producing countries.

The thickness of its auriferous veins is perhaps less than those of California and some other countries, but they are, generally speaking, richer in visible gold than the average of those I have seen in any other part of the world. It must also be taken into consideration that Nova Scotia possesses many decided advantages over both California and Australia. Each of these countries is situated at a great distance from Europe, and can only be reached after a long and expensive passage, and, as a natural consequence, wages were for a long time exceedingly high and provisions proportionately dear. Nova Scotia, on the contrary, is within an easy distance both from Europe and the United States of America, and possesses a considerable settled population of intelligent, industrious, and sober people, eminently adapted, after a little experience, to become steady and efficient miners. The whole of the gold-bearing portion of the Province also lies within a convenient distance from the coast, which abounds with magnificent harbours, affording ample security to shipping, whilst wood in large quantities is to be everywhere procured for all descriptions of mining uses, and an abundant supply of water is generally to be met with for the purposes of washing and amalgamation.

From these circumstances, it is impossible that wages can ever reach the extravagant rates that mainly led to the failure of nearly all the gold-mining enterprises of 1852, since which period many of the mines have been advantageously worked which were then abandoned on account of the enormous expenditure necessary to carry on the operations.

GOLD OF NORTH WALES.—The gold district of North Wales would appear to be chiefly confined to an area of about 20 square miles lying on the north of the turnpike road leading from Dolgelly to Barmouth. In this region the Cambrian rocks are overlaid by the Silurian, and the general geological features of the country strongly resemble those of other auriferous localities.

The most important discoveries have been made in the Dol-y-frwgnog, Prince of Wales, and the Clogau mines, of which the latter only is at the present time worked with remunerative results. So long ago as 1844 a paper was read before the British Association by Mr. Arthur Dean, who stated that a complete system of auriferous veins exists throughout the whole of the Snowdonian or Lower Silurian formation of North Wales. In consequence of this statement operations were commenced at Cwm-hesian, but the results obtained not having been found satisfactory they were finally abandoned. Ten years subsequent to this the mine was again worked for gold, but still with unfavourable results. Machinery for crushing and amalgamation was about two years afterwards erected at Dol-y-frwgnog, but, after operating on several hundred tons of quartz, the result was in this instance also a failure. Of all the auriferous veins in the neighbourhood of Dolgelly that at present worked in the Clogau mountain is

certainly the most important. This mine is situated at a height of about a thousand feet from the level of the sea, and the workings are extended on what is called the "St. David's" or "Gold lode." This lode, which is almost perpendicular, runs nearly east and west, and is chiefly composed of auriferous quartz, more or less impregnated with sulphides of iron, lead, and copper. The vein stone also exhibits large quantities of disseminated gold, which generally occurs in a state of minute division. This mine is being worked on a small scale, and by means of very simple and far from perfect machinery; the following returns were however made during the course of the year 1861:—Ore crushed, 456 tons, 32 lbs.; fine gold obtained, 2,884 oz., 1 dwt., 7 grs., being at the rate of $6\frac{1}{2}$ ounces per ton of quartz operated on. During the current year, up to April 26th, the results have been:—Ore crushed, 255 tons, 16 cwt., 16 lbs.; fine gold obtained 1,962 oz. 2 dwts., or $7\frac{1}{2}$ ounces per ton of quartz.

It is needless to add that such a degree of success has given rise to the commencement of numerous mining operations in various parts of the district, but if gold mining in Merionethshire is approached in the speculative spirit that characterized the proceedings of 1852, it requires no prophet to foretell that numerous failures must necessarily be the result.

METHODS FOR EXTRACTING GOLD FROM ITS MATRIX.—The most simple and at the same time most ancient method for obtaining gold is undoubtedly by washing the sands and dirt with which it is found associated. On a small scale this may be performed either in a bowl or tin pan, but when greater expedition is sought, recourse must be had to appliances of a somewhat more complicated nature. Among the earlier miners in California and Australia the *cradle* was much employed. This instrument appears to have been introduced from Virginia and Carolina, and consists of an oblong inclined box, having a sieve at its upper extremity mounted on rockers, so that by means of a handle it may be swayed from side to side. The interior of this case is provided with a sloping diaphragm of tightly-stretched canvass, and the bottom is divided into partitions by means of wooden cleets. Washing by the cradle is, however, a very slow operation, and requires a great deal of manual labour, since besides rocking it is necessary to supply it with water by means of a dipper, and to continually stir the fresh brought stuff deposited on the sieve. The gold and other heavy bodies retained between these wooden divisions are finally re-washed in a tin pan, and the metal is thus obtained in a pure state. The losses of fine gold attending this operation are very great.

The arrangement which next came into general use among Californian miners was the *long tom*. This consists of a long, roughly-made, wooden case, having a considerable inclination, and provided at its lower extremity with a sieve made of perforated sheet iron, beneath which is placed a "rifle box" divided into compartments, as in the case of the cradle, by means of slips of wood. Into the upper trough a stream of water is so directed as to fall with considerable force upon the auriferous drift with which it is charged, and this being continually stirred with a shovel, the finer particles are gradually washed through the sieve over the rifle box, whilst the coarser fragments are from time to time removed after being duly examined for any nuggets they may contain. The stuff retained by the rifles is afterwards washed in a pan, and the clean gold thus separated. The tom has the advantage over the cradle of getting through a much larger amount of work within a given time, but it requires a much more plentiful supply of water, and the loss of fine gold is great.

When conveniences exist for its introduction, the *sluice* has now generally superseded the tom. This arrangement is nothing more than a long run of wooden troughs provided with false bottoms in which augur holes have been bored to a certain depth, and in these mercury is generally placed. Through these inclined

troughs the "pay dirt" is washed, and the metal, from its greater density settling in the depressions at the bottom, and combining with the mercury placed there for that purpose, is thus retained. These false bottoms are occasionally removed, and the mercury separated from the gold by filtration and subsequent distillation.

This process, although a certain portion of the gold is still lost, is generally much preferred to either of those above described.

It is also now customary, whenever a sufficient fall of water can be obtained, to direct a stream, by means either of metallic tubes or canvass hose, against the bench of pay dirt it is intended to remove. A powerful stream playing against the side of a hill will in a short time disintegrate a large quantity of dirt. The rubbish thus detached is conducted through a sluice in the usual way, and the gold is in this manner separated and collected. This method of proceeding is known by the name of *Hydraulic Mining* and is, generally speaking, considered the most economical that can be adopted.

When, instead of being found in deposits of pay dirt, the gold occurs in veins, associated with other metals, it becomes necessary to reduce the gangue to a state of fine division before it can be extracted. Two distinct methods are employed for the separation of this metal from the matrix with which it is associated, viz., washing and amalgamation.

In some countries, and particularly in Mexico, the *arrastra* is much employed for the treatment of auriferous minerals. This consists of a vertical axis, provided with cross arms, to which are attached, by means either of ropes or thongs of untanned leather, two or more heavy masses of porphyry. Mules are harnessed to one of the projecting arms, and a rotatory motion given to the shaft. The stones thus set in motion are dragged over a well-paved bed, and thus, by an action somewhat resembling that of the common miller and slab, the ore is gradually reduced. Mercury and water are added to the ores operated on, and the resulting amalgam is from time to time passed to the retort.

In some instances the ores are introduced into the *arrastra* in fragments of about the size of peas, but in large establishments it is first coarsely ground in a stamping mill. It is needless to say that grinding by means of the *arrastra* is a slow and expensive operation.

In Chili the *trapiche* is much used. This is nothing more than a grinding mill, like the ordinary edge-runner. The roller runs on a grooved bed-stone, in which a certain quantity of mercury is placed, and by the continual trituration of the revolving runner the ore is gradually reduced and amalgamation effected. This is, however, like the foregoing, a tedious and costly operation.

In some cases a mill like that commonly employed for grinding corn has been made use of, and found to answer remarkably well.

In one establishment where apparatus of both constructions is in operation, the ratio of the cost of grinding by the horizontal mill as compared to the edge runners, is as 2s. 3d. to 6s. 10d.

The ordinary roller crushing-mill has also been employed for the reduction of gold quartz previous to amalgamation, but it cannot be considered to be well adapted for this purpose. In the first place the whole of the stuff coming from the mill has to be passed through sieves of fine wire-gauze, and these become so rapidly worn by the rougher fragments which are being returned to the raff-wheel, as to render repairs constantly necessary, and the operation very expensive. Then, again, unless the ore be remarkably dry, these sieves choke, and the stuff is carried round and round without passing through; and, finally, if the ore be dry, such a dust is created as to nearly choke those attending to the crusher.

Among the quartz miners of California and Australia the stamping mill is now the machine almost universally employed. The ore is often first calcined in heaps or kilns,

and, after stamping, the reduced mineral is passed through apparatus of various forms for the separation of the gold.

The calcination of the quartz, although not always adopted, is frequently productive of advantageous results.

Hard quartz is rendered much more friable by this treatment, and when a large proportion of sulphides is present, the expulsion of sulphur by the operation of roasting is likewise beneficial. It is also probable that when gold occurs in thin finely-divided laminae, the ignition of the quartz produces such an agglutination of its particles as to cause them to offer less surface to the action of the water, and that the loss of "float gold" is thereby diminished.

The metal is separated from the stamped ore either by washing alone, or by washing and amalgamation. When the former process is resorted to, the stuff flowing from the stamping mill is either allowed to pass over riffle-boxes, or is conducted over blankets, or skins on which the hair is retained. These are occasionally washed in proper vessels, and the metal retained by them thus collected. The gold so obtained is, in most instances, concentrated by washing in a *batea* or otherwise, and finally amalgamated, or less frequently fused with litharge, or an ore of lead, and finally cupelled.

When amalgamation is employed, the riffle-boxes may be charged with mercury, or the auriferous sands produced can be passed through triturating apparatus containing mercury with which the gold is caused to combine. In some cases barrel amalgamation is resorted to. The diagram on the wall exhibits a combination of three of the most efficient amalgamating appliances used by the miners of California and Australia, which is well calculated to separate the precious metal from ordinary gold quartz. The ore flowing from the mill first passes over a lip through a triturator not unlike that employed at Zell in the Tyrol, and then falls into an apparatus, the action of which is similar to that of the amalgamating barrel. Finally, the whole of the stuff before passing over riffle-boxes or blankets, is agitated in a column of mercury through which it is made to descend. In some instances, where water is not plentiful, that from which the tailings have settled is again pumped round. In this case a little wood ashes should from time to time be thrown into the mill. This is employed for the purpose of saponifying any oil or other fatty matter which, if present in *even the most minute proportions*, when quicksilver is used, would, by preventing the particles of gold from uniting with the mercury, materially interfere with the results obtained. It is, therefore, of great importance in all quartz-crushing and amalgamating establishments, that proper care be taken to prevent any dropping of oil from the bearings into the apparatus, since the result of such an accident would inevitably be a notable falling off in the produce of gold obtained. In order to prevent loss occurring through this cause it would, as before stated, be found advantageous to throw from time to time into the mill a little wood ashes or some other alkaline body, for the purpose of removing any greasy matter which may have become accidentally introduced.

When the quartz contains an appreciable quantity of auriferous sulphides, it would in many cases be found advantageous to separate these from the tailings by means of a Hunslet's buddle applied to the end of the riffles. The sulphides thus collected might be treated either by fusion with oxide of lead, and the produce cupelled for gold, or after a preliminary roasting be again subjected to amalgamation. The former process will, however, in many instances prove the most advantageous.

As an instance of the small yield of gold which, even in Australia, is at the present time found remunerative, I would quote the following results of the Colonial and Port Philip Company. It must, however, be observed that, to obtain a satisfactory profit from ores of this class, it is necessary not only that large quantities should be treated, but also that the greatest economy should be observed in every department of the manipulation.

The quantity of quartz crushed by this company between October 1st, 1860, and September 30, 1861, was 32,253 tons, from which the produce was 24,336 ozs. 6 dwts., being an average of 15·2 dwts. per ton. The quantity crushed during the preceding year was 21,693 tons, and the produce 17,466 ozs., being an average of 16 dwts. per ton, showing an increase in crushing of 10,563 tons, and on the yield of gold of 6,870 ozs. over the same period of the previous year. It will be perceived that the yield of gold per ton had experienced a variation of 22 grs., equal to 5¼ per cent. The total expenditure per ton has been 12s.; in the preceding year it was 16s. The profit on the quartz crushing for the year ending September 30th was £22,958 16s. 5d.

ASSAY OF ORES CONTAINING GOLD.—Minerals containing gold are in most instances assayed in precisely the same way as those affording silver.

To make an assay of auriferous quartz, the sample to be operated on is first finely pulverised, and a given weight subsequently well mixed with litharge, carbonate of soda, borax, and an amount of charcoal dust sufficient for the production of a button of lead of a convenient size for cupellation. The metallic globule remaining on the cupel after this operation will contain all the gold present in the ore, together with any silver that may be associated with it, as well as a certain minute portion of that metal derived from the lead of the reduced litharge.

In the case of the poorer ores, containing less than 10 dwts. of fine gold to the ton, the silver derived from the litharge will frequently be found amply sufficient for the purposes of inquartation, whilst for the richer varieties the addition of a little pure silver at the time of placing the button on the cupel is often necessary. When, in addition to gold, the ore contains small quantities of iron pyrites, or other sulphurised mineral, it not unfrequently happens that the admixture of charcoal or any other reducing agent becomes unnecessary, and the fusion may be made with litharge alone.

When, however, pyrites, blende, or other metallic sulphides are present in large quantities, the sample must either be treated by scorification, or it must be first roasted until all the smell of sulphur has disappeared, and then treated as in the case of substances not containing that body, but with the addition of a large proportion of borax. It is, however, to be remembered that when any of these compounds contain sulphur, it is of importance that the whole of it should be removed either before or during the process of obtaining the leaden button, since otherwise, and particularly in the presence of alkaline fluxes, a portion of the gold may enter into combination with the slags in such a way as not to be entirely separated from them by the action of metallic lead.

It may be proper to remark here that although nothing is more easy than to estimate with great accuracy the amount of gold contained in any given specimen of gold quartz, it is considerably more difficult to obtain a fair average sample of the usual produce of a vein. When the metal is in a fine state of division, and equally disseminated throughout the gangue, this presents less difficulty; but when, on the contrary, it occurs in pockets and irregular deposits, it frequently requires the exercise of great care in order to avoid falling into very serious errors.

It is consequently of the highest importance that whenever ores are to be assayed for gold, the greatest care should be observed in preparing the samples on which the operation is to be conducted. With this view, the heaps or piles should be fairly cut through, two or three tons being taken from each parcel of importance, and reduced to fragments not exceeding the size of beans; this may be effected, when crushing machinery is not available, by breaking the ore by the aid of properly-shaped hammers on iron plates. This operation is technically called "buckling." The ore thus prepared is now to be thoroughly mixed, again made into a pile and again cut through, taking out of it this time from three to four hundred weights, which are reduced to the state of fine powder,

either in a large mortar or by grinding on an iron plate. After well mixing, this powder is again cut through, and about 20 lbs. weight taken, for the purpose of being still further reduced in size, and passed through a sieve of fine wire gauze. Should any flattened particles of gold remain in the sieve, they are to be carefully collected, cupelled, and parted, and due allowance made for them in the result obtained by direct assay. Of the finely-divided ore which has passed through the sieve, at least six different assays of one thousand grains each should be made, and their mean result taken as representing the produce of the parcel of ore of which it is the object to determine the value.

By operating in this way, almost absolute accuracy may be ensured; but when a less degree of exactitude is necessary, the quantity of crushed ore may be reduced and the number of assays fewer.

If after thus accurately testing the produce of a parcel of ore, it be passed through the most efficient crushing and amalgamating machinery with which we are acquainted it will be found that the total amount of gold originally present in the stuff is never obtained, and if this deficit be sought for in the tailings resulting from the operation, it will be discovered that a certain small quantity of the precious metal still remains unaccounted for. This deficiency would appear to be due to the circumstance of minute particles of flattened gold having floated off on the surface of the water, and frequently amounts to nearly two dwts. per ton of ore treated.

When the ore to be examined contains silver in addition to gold, and it is desirable to ascertain its amount, it becomes necessary first to cupel the button of lead without the addition of silver; the metallic globule thus obtained is weighed and its weight noted, deduction being made for the weight of silver derived from the reduced litharge, which must be ascertained by a distinct cupellation. If more silver is required for the operation of parting, it is added, and the button, together with the fragment of silver, is enveloped in a piece of pure lead foil, and again cupelled. Lastly, the resulting globule is dissolved in nitric acid, and the gold weighed. The weight of silver present in the ore will consequently be represented by that of the button of alloy obtained from the first cupellation, less the united weights of the gold and the silver resulting from the reduced litharge.

In concluding this subject I cannot better express the great importance of obtaining fair samples than by quoting the words made use of by Dr. Percy, in a lecture delivered in 1852, at the School of Mines, who, when speaking of gold assays, said, "Above everything be particular in obtaining an honest and fair sample. This is a matter of paramount importance, and of no small difficulty in many cases, but let there be honesty of intention and this difficulty will be generally surmounted."

GOLD MINING SPECULATIONS OF 1852.—Shortly after the discovery of the gold deposits of California and Australia, numerous associations were organised in the United Kingdom for the purpose of working gold mines in those countries, and I regret to say that, in almost every instance, these have resulted in the total loss of the capital so embarked.

Various circumstances have contributed to produce these disastrous results, but none more so than the fact that, in too many instances, sufficient attention had not been paid to obtaining samples fairly representing the average produce of the various veins which it was intended to work.

The specimens which reached this country were often picked samples, and on being placed in the hands of the assayer yielded a produce which was far from realised when fair average samples of the leads came to be tested on a large scale. Then, too, it was not unfrequently found that quartz veins, producing what should have been a remunerative amount of the precious metals, were situated in localities in which, either from the want of water or some other cause, their exploitation was

attended with extraordinary difficulties. And, above all, the excessive price of labour, and all other mining requisites which then prevailed, was, in most cases, a sufficient barrier to anything like remunerative returns to the proprietary.

It is sufficiently evident that, in a country where an egg sells for a shilling, and a fowl for a guinea, a much larger amount of gold will be required in order to afford remunerative results than in one in which the necessities of life can be procured at a more moderate rate; and it is also much less difficult to control the labour of a large staff of operatives where employment is comparatively scarce, than where any man of moderate industry may, by working on his own account, earn nearly twenty shillings per day; the natural effect of such a state of society being, that, in the first place, work of all kinds is necessarily expensive, and, secondly, that the supply of labour is very precarious.

In all rich and newly discovered gold districts, which have for the most part a very limited resident population, the alluvial and easily worked deposits afford for a considerable time a superabundance of remunerative occupation for the newly arrived immigrant, but as these gradually but slowly become exhausted, something more than mere muscular strength becomes necessary in order to keep up the returns, a more systematic method of mining is adopted, a thorough combination of labour and the investment of larger capital are required.

It must, however, be remembered that these changes, although gradual even in a new colony, are infinitely more rapid than those who have always resided in European countries generally imagine. Ten years in the life of a colony, and particularly a gold-bearing one, effect greater changes in its commercial and social relations than a century in an old established country, and we have, consequently, no reason to be astonished that veins are at the present moment being advantageously worked both in Australia and California when, in 1852, such operations would have been attained by a certain and very considerable loss.

It is a generally admitted fact that veins of auriferous quartz have little or no relation, with regard to the expense of working them, with the more readily worked alluvial deposits in their vicinity. In the one case the rock has to be broken, crushed, and washed, at a considerable expenditure of time and money, whilst in the other, nature has for centuries been carrying on these operations and so preparing the gold as to admit of its extraction by very simple means. It consequently follows that the period at which quartz veins can be advantageously worked in any given locality will not entirely depend on their yield, but will also be more or less influenced by the abundance and richness of the alluvial diggings in their vicinity, and the general price of labour and materials in the district.

The supply and consequent price of labour must also be materially influenced by the distance at which the gold producing countries may be situated from the great centres of civilization. From their remoteness and their consequent difficulty of access, Australia and California for a considerable period offered striking examples of the demand for labour exceeding the supply, but the constantly increasing facilities afforded for travelling, and in some instances their nearer proximity to Europe, will probably prevent this occurring to the same extent in the more recently discovered gold fields.

There is, therefore, every reason to believe that the amount of gold annually derived from the working of gold quartz will go on gradually and rapidly increasing—and that, by the introduction of efficient and powerful machinery, ores of a very low produce will ultimately be treated with advantage.

These observations particularly apply to the Province of Nova Scotia, whose geographical position renders it impossible that labour should ever attain an excessive value, whilst, if a large supply of auriferous quartz can

be obtained from the mines of North Wales, it is evident that a very small yield of gold, if continuous, might be rendered remunerative.

The operations of separating oxide of tin from its matrix, and gold from its ores, are, in many respects, exceedingly analogous, and consequently the expenses incurred in the one case may (all other circumstances being the same) serve approximately as a guide for estimating the cost which should be incident to the other.

The most efficient apparatus employed in this country for the reduction of ores to the requisite degree of fineness are undoubtedly to be found in the tin mines of Cornwall; and as an example of the expense attending the process of stamping, it may be stated that at Polberro Consols, in the year 1854, a 36-inch condensing engine, working at 55 horse power, stamped no less than 30,200 tons of tin stuff, at a total expenditure of 1s. 3½d. per ton. Each head stamped, therefore, 420 tons per annum, or 28 cwt. per 24 hours, whilst the whole number reduced 100 tons per day at a cost of 2s. 4d. per horse power. During the same year the average produce of the stuff stamped was 20½ lbs. per ton, and the net profit on the operations £2,350 9s. 8d. If we now assume the value of black tin to be 8d. per lb., and that the expense of stamping an equal quantity of gold quartz would have been the same, the total value of the produce obtained from each ton will be 13s. 10d., or equal to a yield of about 3½ dwts. of fine gold.

It must, however, be admitted that the cost of stamping a ton of ordinary gold quartz will be somewhat greater than that of treating an equal quantity of Polberro tin stuff, and that when the gold is in an exceedingly minute state of division, or where sulphides are present in large quantities, the separation of the gold may sometimes be attended with a certain amount of difficulty, but this difference will, in many cases, not be material.

It is therefore evident that when large quantities of auriferous quartz can be obtained in a country where the price of labour is not high, it is not necessary that it should contain a large amount of the precious metal in order to render its treatment by the aid of well constructed machinery remunerative.

As an instance of the very small yield which, under peculiar circumstances, may be rendered available, I would adduce the fact that at Schemintz, in Hungary, in the year 1842, the total quantity of ores stamped was above 40,000 tons, and the average of the useful metals extracted from 50 tons was—gold 3 oz.; silver derived from the separating process 3½ lbs.; lead similarly obtained 8½ cwt.; the ratio of the gold to the other materials being here as one to half a million. It is also important to state that in this instance the ores had to be broken from solid lodes, at depths extending to 200 fathoms from the surface.

DISCUSSION.

Mr. MITCHELL gave an explanation of a model of a machine exhibited by him, which he said was for the purpose of further crushing the gold ore after it passed from the stamping machine. It was found that the quartz was not crushed sufficiently fine when it passed from the ordinary machines, and it was necessary to subject it to a triturating action. Generally speaking, a machine like a common corn mill had been employed for such purposes, but his machine, he said, effected the trituration far more perfectly than the ordinary corn mill. It was nothing more than a modification of the mill employed for grinding coke and charcoal for foundry's purposes, or for the grinding of indigo for calico printers. It consisted of a circular pan, in which were four balls of iron. In an ordinary mill the balls were so driven that they had a tendency to wear into an oval form, and the machine soon lost its efficacy. In the course of a short time the lower portion of the ball, which should rest upon the machine and the material to be ground, ceased to do so. To prevent that, in this machine the balls were driven by a conical roller. The effect of this was that the balls revolved upon two

axes, so that they remained perfectly spherical, and fresh surfaces of the balls were constantly brought into play. In that case, if the substance submitted to the action of the machine were gold quartz, each particle of gold became polished by the frictional action of the balls in the pan, and was then more ready to be taken up by the mercury to which it was afterwards submitted. After it had been sufficiently triturated by this machine, which was determined by the size of the wire gauze employed, it was then passed into a gutter and ran into an amalgamating machine, which was composed of two troughs, divided in the centre by a partition. In each of these troughs a screw ran, both screws being turned by cog-wheels working one into the other, revolving in opposite directions, the operation of which was, as soon as the ore and water passed into the machine, a current was established by the action of the screws from one end of the troughs to the other. Before starting the machine mercury was placed in each of the troughs. There were 12 troughs in a complete machine, and these were used in succession. The ore passed into one trough and there remained for a certain time. The excess passed into the next trough, and so on until it passed through the whole series. To give an illustration of the progress of the ore from the first portion, from the triturators to the amalgamators, they might suppose they were treating ore which contained 3 oz. of gold to the ton. No. 1 amalgamator would remove something like 10 to 12 dwts. of gold from it, leaving still comparatively rich gold-quartz to pass to the second trough. That would remove a certain number of other dwts., leaving it still free to pass to the third trough, and so on until the final result was a gold quartz containing 3 or 4 dwts. only to the ton. Mr. Mitchell proceeded to give the results of this process in the various stages, ranging from 2oz. 5dwt. 17grs. to the ton in No. 1 trough, down to 2dwt. 2gr. in the last trough; and in the case of richer ore, containing 38oz. 12dwt. of gold to the ton, No. 1 trough would yield 16oz. 12dwt. of fine gold; No. 2, 10oz.; No. 3, 8oz.; No. 4, 5oz. 19dwt.; No. 5, 4oz. 5dwt. down to 1dwt. 23gr. The construction of the machine in question had been based upon the fact that both gold and silver ores, in the process of amalgamation, required a very large surface of mercury to be exposed, in order to extract the whole of their precious contents; and in this machine, with a series of twelve amalgamators, there were upwards of 250,000 square feet of mercury exposed to the ore passing through it in one hour. The amount of mercurial surface was larger than in any other machine. At the St. John Del Rey and other Brazilian mines, the ore was kept in contact with the mercury for 36 hours, but in the machines employed there the surface of mercury was comparatively small, whereas, if ore of that richness were placed in this machine, the contact with the mercury need not be continued more than 2 or 3 hours, because of the large surface of mercury employed. If a large surface of mercury were employed, it required less time; if a small surface of mercury were employed, it required a longer time. Consequently, in any machine for the extraction of gold from the ore, the object should be to have a large surface of mercury exposed.

Mr. JOSIAH HARRIS said, in the year 1854 and for two or three years afterwards, he devoted considerable time to the gold question in North Wales, and he would offer a few remarks with reference to the discovery of gold in that country, believing the subject to be of great importance. He believed Mr. Phillips had curtailed the extent of the area in Wales over which gold had been discovered. It extended over 60 square miles instead of 20, and contained numerous auriferous quartz lodes; in fact, he was of opinion the quantity was almost inexhaustible. The St. David's lode, instead of being nearly perpendicular, as stated by Mr. Phillips, dipped north about 18 inches per fathom, and was found to be rich in visible gold from near the surface to a depth of 23 fathoms. That discovery had

taken place within the last two or three days, showing not merely surface deposits, but that they extended to a considerable depth, and were found to be equally as rich at the lowest part as at or near the surface. In 1853 Mr. Goodman, who had paid a great deal of attention to the subject of gold in Wales, found on the surface about 250 tons of auriferous quartz, which had been lying there for 18 years. 100 tons of that quartz were dressed for copper, when it was found to be so rich in gold, that the smelters were anxious to obtain an additional supply, but from some circumstance or other that wish was not complied with. At that time Berdan's pans were in vogue, and two or three of them were erected on the Clogau property. From a circumstance not well understood, although the ore was rich in visible gold, yet there was great difficulty in extracting it; the consequence was, the operation was abandoned, but within the last two years the mine had been reopened, and the same pans had been used with a different method of operation. Instead of 6 or 8 tons of quartz being passed through the pans per day, only from 20 to 30 cwt. per day were passed through them, and only one ball was used instead of two. The same machinery was used and the same description of quartz was operated upon, and it had been proved that this was not only a very rich mine, but one of the richest known either in this or in any other country. There were upon the table some extremely rich specimens, which had been obtained by Mr. Goodman from an ore which had been lying on the surface for 18 years; and such specimens as that shown would yield at the rate of something like 3,000 ounces of gold per ton. That, however, was an isolated specimen. At the Exhibition that day he had seen large masses of ore equally rich in gold, and he believed they were now working as much as 500 tons per week of that ore; and when it was considered that the same machinery was used now as formerly, it would be seen that some progress had been made in knowledge as to the mode of extracting gold from the ore. It was stated in the paper that the Cwmhesian mine was opened some years ago, but the results not having been found satisfactory the operations were finally abandoned. He (Mr. Harris) would state that the Cwmhesian property was worked in 1854, and the same machinery was used as at Dol-y-frwngnog for extracting the gold. The lode was extremely rich in comparison with many others. It contained 15 dwts. of gold to the ton of ore, and he believed there would be no difficulty in making that as paying a concern as the Clogau mine. The lodes were from 20 to 30 feet in width, exhibiting an almost inexhaustible quantity of gold quartz. At Dol-y-frwngnog as much as 12 oz. of gold per ton had been washed by hand, at a cost of £3. He found by the returns from the Port Philip colony, given in that day's *Times*, the average produce of the last month had been 10dwts. 8gr. per ton, and the cost of collecting and crushing was 8s. 4d. per ton, which left a large margin of profit, and if they could extract gold in Australia, where the expense of fuel, machinery, and labour was very great, and make a profit out of 10 or 12dwts. per ton, with the auriferous rocks of South Wales yielding 15dwts. per ton, he thought there was a fair chance of the profit being highly satisfactory.

Professor TENNANT called attention to a model on the table of the last large nugget called the "Welcome" which had been received from Australia. He held in his hand the first nugget which was brought to England in 1851, which created so much sensation in the Great Exhibition of that year. It was from New South Wales; and the impression on the minds of some people appeared to be that gold would thereafter be so cheap that sovereigns would not be worth more than 2s. 6d. each, but sovereigns were as valuable now as they were then, although by reference to the excellent catalogue of the Victorian part of the Exhibition, he found that the amount of gold extracted from the mines of that country was worth something like £100,000,000 ster-

ling, and the weight of gold exceeded £1,000 tons. What the probabilities of the future supply to the English market and the world were, he was not prepared to discuss. He had brought a specimen of gold quartz rock from Nova Scotia, which belonged to a gentleman who read a paper a few evenings since at the Linnean Society. That was the kind of stone they were mending their roads with in Nova Scotia, and was one of the most interesting specimens he had ever seen from any country, having at one corner a large mass of gold. There was about £10 worth of gold visible, but the quantity invisible he could not say. It reminded him of a specimen which was some years ago offered to him for £25, but which he did not purchase, upon which the owner broke it up and obtained from it gold exceeding £42 in value. In the first place, they had to consider who were the persons who collected the gold, and what was the amount of their knowledge on the subject; and secondly, was gold the only substance which remunerated the emigrant. The mineralogist was acquainted with 500 minerals; gold was only one, and they had 499 others, and many of them very valuable—silver, copper, tin, antimony. There were in the case on the table specimens of most valuable minerals from Australia, which were disregarded in the search for gold. They had been in the habit of throwing away a black powder, which was supposed to be the oxide of iron, and considered to be worth not more than a few shillings per ton; but when a sample was sent over five years since, it was proved to be the oxide of tin, worth £45 per ton, which was then being all thrown away. He had placed in a case on the table specimens of various precious stones—the diamond, sapphire, ruby, topaz, &c., in their rough state, and he much questioned whether there were in the room twenty gentlemen who could tell the nature of those specimens if they picked them up. If this were so, how could the navigators and sailors, who were amongst the most successful miners in the gold regions, be expected to distinguish them? They knew gold by its colour; but there were many other valuable substances with which they were not so familiar. Those who visited the Exhibition would do well to inspect the collection of diamonds in the Netherlands department, exhibited by Mr. Coster. He looked upon that as showing a finer collection of gems in their natural state than any other case in the whole Exhibition. There were in that case stones of the aggregate value of, he believed, £1,000,000 sterling. If those stones were thrown upon the pavement in a leading thoroughfare—except as regarded the polished specimens—he questioned whether one person in twenty would consider them worth picking up. He believed they were throwing away in the gold districts the substances to which he referred. Mr. Phillips had not alluded to one district in which he (Mr. Tennant) believed gold had been profitably worked—that was Canada. In the Brazilian Department of the Exhibition they would find some specimens of gold from a district which remained for future discoveries. In that case the gold occurred in granulated quartz, so soft that it could be crushed between the fingers. It was found in a district which was at present unhealthy, but as railways were being constructed to the interior of the country, he believed it was only a work of time for more gold fields to be developed. When they considered the large amount of gold that was annually used in the arts, it amounted in the aggregate to a considerable weight. The large quantity of gold used for picture-frames, the decoration of china, the facias of shop fronts, &c., was all lost. He had been asked what became of all the gold that was brought over to this country? His reply was, it supplied our wants, it enabled us to increase our commerce and civilisation; it extended our luxuries, and would go on doing so for many years to come. But he would draw attention to other substances belonging to the mineral kingdom—silver, copper, tin, antimony, bismuth, nickel, &c. If they could obtain the inferior kinds of diamonds they would be worth £50 per

ounce, whilst gold was only worth £4 per ounce; but if these diamonds could be obtained at £5 or £10 per ounce, they would be the means of bringing many intractable materials into the useful arts which could not be used now in consequence of the cost of the material for cutting them. He begged personally to thank Mr. Phillips for his valuable paper.

Mr. EVAN HOPKINS had listened with great pleasure to Mr. Phillips's paper, which left very little to be remarked upon, but speaking generally on the subject of gold formations, and the systems of extracting it from the ore, according to his own experience, they had very little difficulty, in commencing in a gold field, to find the gold, beginning with the outcrop, and washing out the gold from the debris. Again, with regard to the quartz veins, when the surface had been washed away, they found no difficulty whatever in extracting the gold from the quartz. The Port Phillip Company commenced their operations on a quartz vein which yielded on the surface ten ounces to the ton. It afterwards diminished to six ounces, and as the quantity operated upon and the depth of the workings increased, the average yield diminished; but in consequence of the introduction of stamping and the blanket system, as applied in South America, they were now able to make a profit with stuff producing only 10 dwts. per ton, and they in South America continued to make a profit with a yield as low as 6 dwts. per ton, provided they got 2,000 or 3,000 tons of stuff per month of that average quality. They found no difficulty in getting the remaining gold from the remains of the quartz by re-treatment and the use of finer stamps. At first when they used the Chilean mills with mercury they could not make three-quarters of an ounce per ton pay a profit. He was happy to say they could now work material yielding only 6 dwts. at a profit without quicksilver. The Columbian Mining Association had tried all kinds of machines and grinders, such as those represented, and many more, but they had all proved worthless. By grinding the raw material into an impalpable state in the first instance, they destroyed a large amount of the rough grain gold; and notwithstanding the grinding with the quicksilver for days together, there was a large amount of pure gold which did not become incorporated with the quicksilver, and that was a cause of great loss. That system was abandoned, and from that time they had been working even the refuse of the mines at a profit. All they wanted was plenty of material which yielded gold even as little as 6 dwts. to the ton. With regard to North Wales there was no difficulty in getting the gold. He had been lately at the Clogau mines. In one week he saw $9\frac{1}{2}$ lbs. of gold obtained from 500 cwt. of quartz by the pestle and mortar machinery, and when they put up stamps he had no doubt they would get a greater yield, and would be able to reduce comparatively poor stuff with profit. The cost per ton at the Clogau, with their present mode of extraction, must be excessive. The cost of extraction at Marmato did not exceed 8s. per ton. With reference to the St. John del Rey, the material they were working upon only yielded 37s. worth of gold per ton, and yet they were making a profit of £8,000 or £9,000 per month, as the cost of production was only 17s. per ton, leaving a profit of £1 per ton; but they could not do that unless they had a great abundance of material to operate upon.

The CHAIRMAN inquired whether a model of the stamps employed in the Port Phillip works was in the Exhibition.

Mr. CHAS. FIELDER (Secretary to the Port Phillip Company) replied that the model was not yet complete, but would be at work in the course of the week.

Mr. HOPKINS added, that the auriferous pyrites required much more careful treatment than quartz. The gold in pyrites was in the most impalpable state, and would not bear the least agitation in water.

Mr. HARRIS inquired whether the company did not amalgamate, as well as wash and stamp.

Mr. FIELDER replied that the mixed process was employed. They amalgamated as well as stamped and washed.

Mr. R. A. MACFIE said the question had occurred to his mind, that whereas 400 years ago gold was found in the Pentland-hills and other parts of Scotland, they did not hear of its being sought for or found in that country in the present day.

Mr. HOPKINS was satisfied, if some of the Australian diggers were to go to Scotland, they would not be there a month without finding gold. He did not say it would be worth their while to do so, but if people took the trouble to look for gold they would find it in all countries where the primary slates are exposed, and he saw no reason why gold veins should not be found in Scotland as elsewhere.

Professor TENNANT mentioned that whilst on a visit at Black Mount, in Scotland, he found some specimens of quartz which contained half gold and pyrites. His statement having been doubted by the company assembled there, he extracted globules of gold from three specimens with a tobacco-pipe. This was proof that gold was to be found in Scotland, but it might cost 30s. to obtain 20s. worth of gold.

Mr. PHILLIPS, in reply to Mr. Harris, remarked that it was possible that he had underrated the extent of the gold-bearing district of North Wales, but he believed he was quite correct in stating that the whole of the veins hitherto worked were comprised within the area mentioned. With regard to the roasting of gold quartz referred to by Mr. Hopkins, he (Mr. Phillips) was only aware of one instance in which it appeared to be attended with prejudicial effects. In this case the ores contained large quantities of sulphides, and the gold existed in a state of minute division, and on roasting them in heaps with a large excess of wood, a portion of the gold appeared to have been carried off in washing in the form of alkaline double sulphides. In reference to the observation of Mr. Tennant respecting the Canadian gold fields, he might say that he had visited them nearly ten years since, but that their produce was so small as scarcely to render it necessary to include Canada among commercially gold producing countries. When speaking of Nova Scotia, however, he (Mr. Phillips) had omitted to mention that he had the day previous received a letter from his friend Mr. Annand, the Financial Secretary of the Province, who stated that at Sherbrooke, which at the time of his (Mr. Phillips) visit in November last, was entirely without houses, a small town, with hotels and other requisites, had sprung up, and that three crushing mills were already in progress of erection, the largest and most efficient of them having been forwarded from England by the London and Nova Scotia Gold Mining and Crushing Company (represented in England by Mr. Weir), who had obtained from the Government leases of some very valuable quartz veins situated at Sherbrooke and other places in the colony.

Mr. EVAN HOPKINS said, when he spoke of roasting the ore it was with reference to the cost of the process to the Port Phillip Company. He did not think in that case the gain would be equal to the cost. With regard to the sulphides, when they roasted the pyrites they lost the silver, and they were now doing much better without roasting.

The CHAIRMAN was quite sure they would all agree that they were greatly indebted to the author of this paper for the valuable communication he made. He had seldom listened to a paper of greater interest, or to one in which the various points which the author had undertaken to explain had been more clearly brought forward. The subject he thought he might truly say, was interesting to every one. They had before them one of those models of enormous nuggets of gold found, and, resting their eyes upon that, they saw one of the greatest gems of gold-finding. But the real interest of this discussion rested with the various explanations that had been given by the author of the paper and by the gentlemen who had followed him, as to the discovery and treatment of auriferous ores; because it was evident it was not to chance discoveries like that before them that they

were to look for any long-continued and permanently profitable source of gold-finding. The nuggets might be considered the prizes in the lottery, but the general yield of a district must be looked upon as the fair field offered to human industry, opened by Providence as a means of spreading property and civilization over the world, and of enriching countries which otherwise must have remained barren. Many of the remarks which had been made would be of the greatest possible use to many who were speculating in gold, or proposing to go forth in search of it. They would learn from them much practical wisdom, the result of sound observation and experience; and he considered the Society was under great obligation to Mr. Phillips and the other gentlemen for the candid and able manner in which they had communicated their views. The failures which had taken place in these enterprises, by reason of the enormous cost of labour, were a subject they could look upon as one pregnant with the greatest instruction; but he would, with their permission, mention what had been done, in the way of progress, in one gold-producing colony alone, in the course of the ten years which had elapsed since the first small nugget attracted so much attention in the Exhibition of 1851, because he thought it would bring before them a more vivid and distinct impression of the effects of gold-finding in a general aspect, than most persons would be prepared to expect. The colony of Victoria excited great interest for its gold in the Exhibition of 1851, being at that time only a dependency of New South Wales, and having a population of 77,000 inhabitants. It had since become an independent colony, and had now a population of 540,000. It appeared from the Custom-house returns that the export of gold in 1851 amounted to 145,000 ounces—equal to £580,000; whilst in 1860 it was 2,156,000 ounces—equal to £8,626,000; and the aggregate of the export in ten years was 24,000,000 ounces—equal to upwards of £95,000,000. In addition to this, there was an amount which did not appear in the returns, estimated at 2,000,000 ounces more, so that the whole export was 26,000,000 ounces—equal to £103,941,000. There were now 46 thriving towns. In 1851 there were 39 places of public worship, against 874 at the present time; 30 institutions for charitable relief, and a flourishing university. There were 860 schools, with 52,000 scholars; a public library of more than 30,000 volumes, with 117,000 readers in nine months. In the Exhibition of 1851 there were 37 trades represented in that department, and now there were 236. More than £5,000,000 had been spent in roads and bridges, and £3,000,000 in public buildings. There were 100 miles of Government railway open, and 182 more in course of construction, involving an expenditure of £8,000,000; 15,000 miles of electric telegraph, costing £163,000. Thus it would be seen that, in ten years, greater progress had been made in that colony than would have been the case, under ordinary circumstances, in a century in an old country. There were several points of interest connected with the details of preparing and washing gold, which he thought extremely worthy of attention; and with reference to the question of roasting or not, it must depend upon the peculiar circumstances and the quality of the quartz. He would not detain them longer by his own remarks, but would propose that in which they would gladly acquiesce, viz., a cordial vote of thanks to Mr. Phillips for the very able paper he had read.

The vote of thanks was then passed.

The paper was illustrated by a number of gold specimens from Australia, Canada, Nova Scotia, British Columbia, the West Coast of South America, North Wales, and other localities; also, a quantity of gravel mixed with waterworn crystals of sapphire, topaz, spinel, ruby, zircon, tourmaline, garnets, diamonds, platinum, &c., kindly lent by Professor Tennant, who also laid on the table a

model of the "Welcome" Gold Nugget, found June 11th, 1858, at Bakery-hill, Ballarat. The weight of the original gold nugget was 2,165 oz. It was melted in London, September 22, 1859, and yielded quartz, earthy matter, &c., 146½ oz.; pure gold, 2,019¾ oz. The value of the gold was £8,376 10s. 10d. This was the largest gold nugget known.

The Secretary announced that on Wednesday evening next, the 21st inst., a Paper by Mr. Gerald Ralston, Consul-General for Liberia, "On the Republic of Liberia, its Products and Resources," would be read.

POCKET ANEROID BAROMETER.

Messrs. Frankham and Wilson, of Wilson-street, Gray's-inn-road, have recently made some further improvements in this instrument, specimens of which were laid on the table at one of the Society's ordinary meetings some months since. This barometer is about one inch and a-half in diameter and three-quarters of an inch in thickness, and appears, from experiments that have been made with it, to be an efficient instrument.

Home Correspondence.

MR. WINKWORTH'S PAPER ON SILK.

SIR,—Allow me to say, in reply to Mr. Keith, that there is no mistake in the statement attributed to me. I have, by my process of spinning direct from the cocoon, produced organzine of 4½ to 5 deniers, a sample of which may be seen in my case at the Exhibition. I am weaving it also, and probably it is the finest thread ever woven, being equal to No. 1,200's. in cotton count.

I am, &c.,

JOHN CHADWICK.

12A, Mosley-street, Manchester, 13th May, 1862.

SIR,—I am obliged to Mr. Keith for pointing out the mistake in my paper "On the Silk Department of the recent Italian Exhibition," as to the prices of spun silk. He is quite right, for that article has never been so low in the market as 6d. per lb. I intended my quotation of values to apply only to the husks or waste out of which the silk thread is produced; but, from an omission or error in the wording, it appears to have reference to the latter instead of the former.

I am, &c.,

THOMAS WINKWORTH.

Canonbury, May 12th, 1862.

NEW PROJECTILE FORCE.

SIR,—Some period of time must necessarily elapse before the beautiful theory propounded by Mr. Meschin can be so practically carried out as to become as much the everyday work of all men, as the present mode depending upon ordinary gunpowder. Now, as white gunpowder holds an intermediate position, in regard to its effects, between the common powder and the electric gas, would it not be as well to carry out some experiments as to its practicable application to fire-arms of every description—no alteration in the construction of the guns being required?

The explosive force of common granulated powder depends quite as much upon the rarefaction of the common atmospheric air included between the grains, as upon the gases evolved by the ignition of the powder itself, for when mealed, all projectile force is destroyed. White gunpowder, on the contrary, notwithstanding it is charged in a compact body, still ignites so rapidly as to produce, weight for weight, one-third more gas, and consequently

one-third more projectile force, while the solid residue after combustion is scarcely perceptible. The barrel never fouls if the grease-sponge be inserted in the muzzle only, after every discharge; no loss of time will take place on that account, because the operation of loading is reduced to one act instead of five, as in the usual drill.

White powder is cheaper, weight for weight—can be stored and carried absolutely free from danger by accidental explosion, and is not liable to damp. As far as our experience goes, both the report and the recoil are sensibly less than with common gunpowder, and the smoke is nothing.

The best proportion for white gunpowder is 49 chlorate, 28 yellow prussiate, 23 fine lump sugar.

I should apologise, however, for having designated Mr. Meschin's proposal as a theory, because every position assumed by that gentleman has separately passed through the ordeal of practical demonstration by eminent men.

I am, &c.,

HENRY W. REVELEY.

Proceedings of Institutions.

HALEY HILL WORKING MAN'S COLLEGE, HALIFAX.—The annual meeting of this college for the distribution of prizes and certificates was held on Tuesday evening, the 22nd April, presided over by E. Akroyd, Esq., the principal. Amongst those present were the Revs. W. Littlewood, M.A., H. B. Hall, B.A., W. H. Wawn, B.A., Messrs. T. S. Walsh, E. M. Wavell (town clerk), M. H. Rankin, S. Smith, Jno. Fisher, Dr. Pigott, &c. In opening the proceedings the chairman called on Mr. Gibb to read the report, from which the following are extracts:—"We now have on the books more names of students than on any previous occasion, while the number admitted during the past year is equal to the whole number now on the books. And in the latter case we perceive a fact which is much to be regretted, viz., the apparent instability of some of the students. One class, however, is a remarkable and pleasing exception to this rule; we refer to the theological class, which, though small in numbers, is well and regularly attended, and is, we hope, productive of much good. The staff of the college remains the same, with the exception of Dr. Paley, and great credit is due to them for their thorough method of teaching. The Principal and committee have this year the melancholy duty to record the death of the Rev. J. H. Gooch, late chairman of our local board for the Society of Arts examination. To his uniform kindness and readiness to assist in any scheme for the good of the students, they beg to bear their grateful testimony. And here we cannot but offer our most sincere thanks to Dr. Garlick, who has, in the kindest manner, taught gratuitously an extra collegiate class in geometry. Mr. Wainhouse, who teaches gratuitously the book-keeping class, must also have the satisfaction of seeing that his kindness is appreciated, as the number of his pupils is greater this year than it has been heretofore. The French class, conducted by M. Burluraux, continues as successful and popular as in previous years. The science classes, under Mr. Noble, still continue very popular in the college, and fully maintain their numbers. The elementary adult class, conducted by Mr. J. Spencer, remains in a most flourishing condition, although here also the same observation with regard to some of the students applies. Vocal music continues to be practised by a fair number of the senior division; among the juniors, however, it is hardly so popular, owing, perhaps, to the change of voice which takes place about that age. At the young women's institute a class has been formed, which has more than answered previous expectations. During the past year the library has fully maintained its character for usefulness, more especially with regard to home reading; the news-room is not so much used as it might be. A very large addition has lately been made

to the library, and the theological department has been incorporated with the main division of the library; thus bringing the total number, inclusive of the juvenile departments, up to 4,500 volumes. Smoking, after certain hours, is now permitted, and many avail themselves of the privilege. We have improved our cricket ground, and rendered our bowling green one of the first in this part of the country. The literary and scientific society in connection with the college still continues in a prosperous state. A large case has been presented by the Principal, and is gradually being filled with specimens illustrative of the geology, botany, &c., of the district. A valuable collection of shells, illustrative of British conchology, and another of British fossils and mosses, have recently been added from the same liberal source as the case. We now come to the second great division of our system of education, viz.:—The Young Women's Institute. The same general remarks, with regard to the fluctuations in numbers, apply to this branch of the Institution as well as to the Working Man's College; as, however, a change of teacher has lately taken place, a little more excuse may be allowed. The needlework, one of the most important, and at the same time generally neglected branches of education, is fairly done; while the class in dress-making had advanced so considerably as now to be able to cut out and fit on dresses for each other, with only occasional supervision. The cooking class has been discontinued, on account of the small number of pupils; as, however, a day-school cooking class has lately been established, this class was rendered to a great degree unnecessary; the latter, moreover, by supplying gratuitously nourishing food to the poor and sick when properly recommended, supplies a want long felt in a populous parish. With regard to the condition of the College and Institute, Mr. Watkins, her Majesty's Inspector says:—"Men's Department.—This department is in good order, carefully and intelligently taught, and making very creditable progress, and on the whole a valuable Institution. Junior Department.—The attendants here are much improved in order and regularity of attendance; questions are answered with much heartiness; there is a great deal of general intelligence among them, and good knowledge of the subjects taught. Young Women's Department.—The young women are in a very pleasing state of discipline, and very creditable in attainment. They have improved much in needlework, in which many of them are well skilled, and can cut out and make dresses." Working Man's College;—Number on the books, 223; admitted since Easter, 1861, 226; Average nightly attendance, 96; weekly, 152. Young Women's Institute;—Number on the books, 67; average nightly attendance, 38; weekly, 42. LIST OF PRIZES (Senior Division).—*Arithmetic*—1st class, N. T. Balme; 2nd class, W. J. Priestly. *Euclid*—James Sutton. *Book-keeping*—Joseph Muir. *English History*—Jonas Robertshaw. *Scripture History*—Thomas Stradling. *Chemistry*—D. Parker. *English Literature*—William Brear. *English Grammar*—Ben Spencer. *Geography*—Hiram Haynes. *Chemistry*—E. J. Mycock. *Physics*—J. Bland. (Junior Division). *Arithmetic*—1st class, John Dean; 2nd class, A. S. Holroyd. *English Language*—1st class, John Mitchell; 2nd class, O. Webster. *English History*—George Leech. *Geography*—Joseph Coates. Extra prize for general proficiency in the 3rd class—Joseph Wilson. MEDALLISTS (Senior Division).—Silver; Samuel Sutcliffe; Bronze, John Spencer. Extra prize—Edward Howarth. (Auxiliary Class).—Bronze; Thomas Robinson. (Junior Division).—Bronze; Walter Holliday, Samuel Oldfield, Samuel Schofield. YOUNG WOMAN'S INSTITUTE.—Prizes were given by Mrs. Akroyd for needlework and regularity of attendance."—The meeting was then addressed by the Principal, and by the Rev. W. Littlewood, after which Mr. Akroyd distributed the prizes, which consisted principally of beautiful work-boxes for the females, and medals and valuable books for the males. Mr. Akroyd then proposed a vote of thanks to the examiner; and the Rev. H. B. Hall, B.A., in seconding it, addressed

the meeting for a few minutes, dwelling principally upon the importance of young women being trained to useful work in the homes in which they were destined to live. There was many a man who, like Achilles, was vulnerable in his heel when his stocking was not darned; and he was extremely glad that such simple yet necessary things had found a place in their studies. The Rev. R. L. Carpenter, B.A., moved, and E. M. Wavell, Esq., seconded, a vote of thanks to the Principal, which was carried by acclamation. An exhibition then took place, by means of the oxyhydrogen light, of photographic and other views, which were very beautifully rendered, and afforded much gratification. During the evening several pieces of music were sung by the choir, and two solos by Messrs. Peace and Briggs—Mr. Layton presiding at the piano. The room was tastefully decorated with flags and banners. The National Anthem was sung, after the vote of thanks to the Principal, and the proceedings terminated.

MEETINGS FOR THE ENSUING WEEK.

- MON.....British Architects, 8.
Royal United Service Inst., 8½. Capt. E. G. Fishbourne, "The Character of Gun best adapted for Naval Warfare, as gathered from the various plans of Guns proposed."
- TUES. ...Civil Engineers, 8. 1. Continuation of Mr. H. C. Forde's Paper on "The Malta and Alexandria Submarine Cable." 2. Mr. C. W. Siemens, "On the Electrical Tests employed during the construction of the Malta and Alexandria Telegraph, and on Insulating and Protecting Submarine Cables."
- Statistical, 8. Mr. J. W. Tottle, "On the Powers of the Inclosure Commissioners, and the Principles on which they have exercised them."
- Ethnological, 8. Anniversary Meeting.
Architectural Museum, South Kensington, 8. The Rev. George Williams, "On Ecclesiastical Architecture in Georgia and Armenia."
- ROYAL INST., 4. Mr. C. T. Newton, "On Ancient Art."
- WED. ...Society of Arts., 8. Mr. Gerald Ralston, Consul-General for Liberia, "On the Republic of Liberia, its Products and Resources."
- Geological, 8. 1. Prof. R. Harkness, F.R.S., "On some Metamorphic Rocks in Banffshire and in East Sutherlandshire." 2. The Rev. D. Honeyman, communicated by the President, "On the Geology of the Gold Fields of Nova Scotia." 3. Mr. J. W. Salter, "On some fossil Crustacea from the Lower Coal Measures of Nova Scotia; on *Eurypterus*; and on some tracks of Crustacea in the Lower Silurian Rocks."
- Pharmaceutical, 12. Annual Meeting.
Royal Soc. of Literature, 4½.
- THURS...Royal, 8½.
Antiquaries, 8½.
Philological, 8½. Annual Meeting.
Philosophical Club, 6.
Royal Inst., 3. Dr. Lyon Playfair, "On the Progress of Chemical Arts."
- FRI.Royal United Service Inst., 3.
Royal Inst., 8. Mr. Warrington W. Smyth, "On Coal as one of the great materials of British Industry."
- SAT. ...Linnean, 3. Annual Meeting.
Asiatic, 3. Annual Meeting.
Royal Botanic, 3½.
Royal Inst., 3. Prof. Anderson, M.D., "On Agricultural Chemistry."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

- Par Numb.
Delivered on 12th, 14th, 15th, 16th, 19th, 24th, 25th, 26th, and 28th April, 1862.
153. Graving Docks—Returns.
159. London Fire Brigade—Return.
152. Railway and Canal Bills—Fifth Report from Committee.
165. Navy (East India and China Stations)—Return.
165. Committee of Selection—Fifth Report.
172. Income Tax Appeals (Northampton, &c.)—Return.
151. Transport Service—Return.
162. Chigwell Inclosure—Return.
164. Courts of Justice Building Funds—Copy of a Memorial.
131. Superannuations (Public Offices)—Account.
163. Hops—Return.
173. Scottish Universities—Paper.
30. Railway and Canal Bills (153. Carmarthen and Cardigan Railway)—Board of Trade Report.

130. Increase and Diminution (Public Offices)—Abstract of Accounts.
143. Railways (Railway Accidents)—Return.
146. Treasury Chest (1860-61)—Account.
154. Criminal Offenders (Scotland)—Abstract of Tables.
168. Spirits and Wine—Returns.
170. Public Offices—Returns.
171. Thames Embankment Bill (Estimated Expenditure)—Report.
173. Militia—Return.
174. Woolwich Academy—Return.
175. Barrack Masters—Return.
176. Army—Return.
177. Coroner's Inquests (Metropolis)—Return.
180. Public Income and Expenditure—Account.
169. Great Grimsby Election—Minutes of Evidence.
112 (4.) Civil Services (Estimates)—Class 4.
112. Civil Services (Estimates)—General Abstract.
84. Bills—Small Tenements Rating (Scotland).
87. " Education of Pauper Children.
93. " Lunacy (Scotland).
95. " Metropolitan Building Act (1855) Amendment.
83. " Corrupt Practices at Elections.
85. " Companies, etc.
88. " Red Sea and India Telegraph Company.
90. " Customs and Inland Revenue.
89. " Merchant Shipping Acts, etc. Amendment (amended).
Education—Changes proposed to be introduced into the Revised Code.
Italy (Southern)—Correspondence.
Colonial Possessions—Reports (West Indies, Mauritius, and Ceylon), Part 1.
British Steamer *Orwell*—Correspondence.

Delivered on 29th April, 1862.

91. Bill—Assurances Registration (Ireland).
Victoria (Gold) Despatch.
Delivered on 30th April, 1862.
94. Bill—Grand Jury Secretaries (Ireland).
Dated 1st May, 1862.
43 (3). Trade and Navigation Accounts (31st March, 1862).
Manufactures, Commerce, etc.—Reports of Her Majesty's Secretaries of Embassy and Legation.

SESSION 1861.

- 518 (1). Property Tax, etc. (Metropolis)—Further Return.
Delivered on 2nd May, 1862.
187. Malt—Returns.
189. Hops—Return.
192. Royal Society—Return.
181. Poor Relief—First Report from Committee.
Southern Italy—Papers (Part 2).
Financial Condition of Turkey—Report by Mr. Foster and Lord Hobart.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, May 2nd, 1862.]

Dated 24th April, 1862.

1194. J. Bond, Burnley, Lancashire—Certain imp. in projectiles, which imp. are applicable to horns attached to vessels for war purposes.
1196. J. Winsborrow, 4, Samson-terrace, Marlborough-road, Dalston—Imp. in wet gas meters.
1198. J. A. Traversier, 4, South-street, Finsbury—Some imp. in making ladies' bonnets.
1200. C. W. Belding, 7, King-street, Cheapside—Imp. in harrows or cultivators. (A com.)
1202. R. Mushet, Coleford—An imp. or imp. in the lining, repairing, or 'fettling' of puddling furnaces.
1204. R. Zinna, St. Petersburg—Imp. in stoves for heating and ventilating buildings.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1244. W. T. Glidden, Massachusetts, U.S.—A new and useful mode of restoring phosphatic guano. (A com.)—April, 1862.

[From Gazette, May 9th, 1862.]

Dated 31st December, 1861.

3266. F. Tolhausen, 35, Boulevard Bonne-Nouvelle, Paris—A new method of, and machinery for, covering springs used for petticoats and other articles. (A com.)

Dated 1st February, 1862.

281. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Improved processes for the recovery of the oleic acid contained in the residual scouring waters of woollen and other textile materials or fabrics. (A com.)

Dated 18th March, 1862.

746. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An improved combination of cooling and filtering apparatus, forming a safe for the preservation of solid and liquid provisions. (A com.)

Dated 19th March, 1862.

763. R. Hadfield and J. Shipman, Attercliffe, Sheffield—Imp. in hardening and tempering wire and crinoline steel.

Dated 5th April, 1862.

979. B. Thompson, Walker, near Newcastle-on-Tyne—Imp. in steam engines.

Dated 7th April, 1862.

988. J. Watremez and A. Kloth, Aix-la-Chapelle—Improved apparatus for indicating a deficiency of water in steam generators.

Dated 8th April, 1862.

999. J. Jacques, jun., 102, Hatton-garden—Imp. in the instruments used in the game of croquet. (Partly a com.)

Dated 11th April, 1862.

1052. J. Howard, E. T. Bousfield, and T. Phillips, Bedford—Improved apparatus applicable to steam cultivation.

Dated 15th April, 1862.

1077. C. J. Coxhead, 10, Emeis-terrace, Kentish Town—Imp. in pianoforte actions.

1078. G. Fell and W. Haynes, Bolton—Imp. in machinery or apparatus to be used in the manufacture of leather.

Dated 19th April, 1862.

1149. A. Parkes, Liverpool-street, Birmingham—Imp. in surface condensers.

Dated 21st April, 1862.

1162. C. Callebaut, 4, South-street, Finsbury—Some imp. in sewin machines.

Dated 22nd April, 1862.

1168. S. S. Putnam, Dorchester, U.S.—Certain imp. in machines for forging horse shoe nails and other articles.

Dated 25th April, 1862.

1206. S. C. Salisbury, Coventry—Imp. in the construction of sewing machines.

1210. R. C. Mansell, Ashford, Kent—Imp. in the construction of wheels to be used on railways.

1214. J. Elder, Glasgow—Imp. in steam engines and boilers.

1216. J. Aspinall, Middlesborough-on-Tees—An improved apparatus for the safe conveyance from sea to land of ships' papers, documents, money, and other valuables when wrecks or other casualties occur at sea.

1218. A. C. Kirk, Bathgate, N.B.—Imp. in refrigerating apparatus.

1220. W. Hale, 6, John-street, Adelphi—Imp. in rockets.

1222. L. McLachlan, Manchester—Imp. in governing or regulating light used for taking photographic portraits and other photographic pictures, part of which imp. is also applicable to lighting picture galleries.

1224. W. E. Newton, 66, Chancery-lane—Imp. in chimneys for lamps. (A com.)

Dated 26th April, 1862.

1228. J. G. N. Alleyne, Alfreton, Derbyshire—Imp. in machinery and apparatus for the preparation and manufacture of iron and steel.

1232. F. G. Spilsbury and F. W. Emerson, Stratford, Essex—Imp. in the treatment of fusel oil, and for various applications of the same to useful purposes.

1234. H. W. Hart, Higher Broughton, Manchester—Imp. in the manufacture of reflectors and shades for gas and other lights.

1236. G. H. Smith, North Perrott, Somersetshire—Imp. in the manufacture of crinoline or elastic hoops for dresses.

Dated 28th April, 1862.

1242. J. Fletcher, Farnham-place, Southwark—Imp. in the apparatuses for treating saccharine liquids.

Dated 29th April, 1862.

1250. S. W. Newington, Goudhurst, Kent—Improved apparatus for letting off and stopping the flow of liquids from casks and vessels, such apparatus forming a tap, and substitute for the ordinary vent peg.

1254. R. Bright, Bruton-street, Westminster—Imp. in lamps, and in apparatus for lighting Argand and other wicked lamps.

1256. W. L. Tizard, Mark-lane—Imp. in heating, cooling, and condensing apparatuses.

1260. E. B. Wilson, 5, Parliament-street, Westminster—An imp. in the machinery of apparatus used in the manufacture of malleable iron and steel.

1262. W. E. Newton, 66, Chancery-lane—Imp. in the construction of mowing and reaping machines. (A com.)

Dated 30th April, 1862.

1266. A. I. Mahon, 25, Leinster-square, Rathmines, Dublin—Imp. in projectiles.

1272. E. Leigh, Manchester—Imp. in the construction of ships and floating batteries, in mounting their guns, and in the application of steam power, parts of which improvements are also applicable to land batteries and forts.

1276. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in the construction of couches or settees for the purpose of sitting, lying, or reclining upon. (A com.)

1280. J. L. Norton, Belle Sauvage-yard, Ludgate-hill—Imp. in apparatus for drying fibrous materials and yarns.

1284. H. Willis, Albany-street, Regent's-park—Imp. in valves for the supply and discharge of gaseous bodies.

1286. W. T. Loy, Rood-lane—Improved machinery or apparatus for carding cotton and other fibrous substances of a similar character. (A com.)

Dated 1st May, 1862.

1288. W. B. Smith, Camborne, and W. Bennetts, Tucking Mill, Cornwall—Imp. in the method of, and apparatus for, preventing the injurious effects occasioned by smoke, sulphur, and the deleterious gases which escape from stacks, chimneys, calcining houses, chemical and other furnaces.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

1308. J. Tyler, 5, Kennington-place, Kennington-lane—Imp. in the manufacture of clarionets.—3rd May, 1862.

1333. F. Marrel, Marseille—Imp. in forming wrought iron bars for the manufacture of armour plates and other articles of forged iron.—5th May, 1862.

PATENTS SEALED.

[From Gazette, May 9th, 1862.]

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| <i>May 9th.</i> | 2834. W. J. Hay. | 2894. F. C. Paetow. |
| 2835. R. Bellis. | 2069. R. Harcourt. | |
| 2836. J. Davidson. | 3271. W. E. Newton. | |
| 2857. C. E. Wilson. | 66. J. H. Tatum and W. J. Williams. | |
| 2859. F. Coney. | 380. W. Hewitt. | |
| 2860. R. A. Brooman. | 537. J. Tangey. | |
| 2861. H. Bird. | 571. H. Bowen. | |
| 2865. H. R. Fricker & J. Manley. | 752. W. Tongue. | |
| 2882. J. Booth, T. W. Chambers, and J. Chambers. | | |

[From Gazette, May 13th, 1862.]

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| <i>May 13th.</i> | 2876. J. Spratt. | 2903. T. Redwood. |
| 2885. E. D'Estanque. | 2917. F. Puls. | |
| 2886. D. Stewart. | 2918. L. Thomas. | |
| 2887. R. T. Worton. | 2931. A. F. Yarrow and J. B. Hilditch. | |
| 2888. J. Elze and T. Godfrey. | 2935. T. W. Davenport & S. Cole. | |
| 2891. J. Hawkins. | 2958. J. Willcox. | |
| 2893. P. Andre, J. F. Pline-Faurie, & J. P. Richard. | 2976. J. H. Johnson. | |
| 2895. M. D. Rogers. | 3034. W. E. Newton. | |
| 2896. R. A. Brooman. | 3164. A. V. Newton. | |
| 2898. G. Pyron-Bonneton and M. G. Prodon. | 3227. G. H. Birkbeck. | |
| 2899. A. J. Mundella and W. Onion. | 35. H. D. Pochin. | |
| 2901. L. Smith and M. Smith. | 598. W. Hensman and W. Hensman. | |
| | 603. W. E. Newton. | |
| | 910. M. Henry. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, May 13th, 1862.]

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| <i>May 6th.</i> | <i>May 8th.</i> |
| 1142. T. Jones. | 1160. F. V. Hadlow. |
| 1149. M. Henry. | 1314. L. Farrenc and B. Subra. |
| 1153. R. Pearsall. | <i>May 10th.</i> |
| <i>May 7th.</i> | 1229. R. Romaine. |
| 1275. A. V. Newton. | 1316. G. Hadfield. |
| | 1437. A. V. Newton. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, May 13th, 1862.]

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| <i>May 5th.</i> | <i>May 8th.</i> |
| 1085. R. McConnell. | 1044. D. Morrison. |
| <i>May 6th.</i> | 1045. G. Taylor. |
| 1031. J. Bowron. | 1057. J. Harrison and T. Summerson. |
| 1091. R. S. Newall. | <i>May 10th.</i> |
| <i>May 7th.</i> | 1071. J. Herdman. |
| 1030. J. A. Williams. | |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4477	May 8.	Double-breasted Waistcoat	James Cocks	25, Cornhill, E.C.
4478	" 10.	Improved Shooting-Coat Pocket... ..	James Cocks	25, Cornhill, E.C.
4479	" 10.	Improved Oil Can	I. Timmins and Co.	15, Brearly-street West, Birmingham.
4480	" 13.	New Lever Check-Winch for Fishing ..	Thomas Aldred	126, Oxford-street, W.

Journal of the Society of Arts.

FRIDAY, MAY 23, 1862.

CONVERSAZIONI.

The second and third Conversazioni of the present season will be held at the South Kensington Museum, on the 9th of July and the 8th of October.

INTERNATIONAL EXHIBITION OF 1862.

SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £451,800, have been attached to the Deed.

TWENTY-FIRST ORDINARY MEETING.

WEDNESDAY, MAY 21ST, 1862.

The Twenty-first Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 21st inst., Lord Alfred S. Churchill, M.P., in the chair.

The following candidates were balloted for and duly elected members of the Society:—

Chandler, Alfred H.	11, Leadenhall-street, E.C.
Clarke, Somers	57, Regency-square, Brighton.
Collie, Alexander	Manchester.
Hopkins, Evan	15, Clarendon-gardens, Maidahill, W.
Jowett, John	48, Conduit-street, W.
Lambert, Frs. Devereux	Oakfield, West Croydon, S.
Smith, Chas. Edward	Fir Vale, Sheffield.
Southgate, Tufnel	7, King's-bench-walk, Temple, E.C.
Wood, Richard Mason ...	89, West Smithfield, E.C.

The following Institution has been received into Union since the last announcement:—

Nottingham, People's Hall.

The Paper read was—

ON THE REPUBLIC OF LIBERIA, ITS PRODUCTS AND RESOURCES.

By GERARD RALSTON, CONSUL-GENERAL FOR LIBERIA.

The small Republic of Liberia, founded by the benevolence of the American Colonisation Society on the West Coast of Africa some 40 years ago, for the purpose of furnishing an asylum to the free people of colour in the United States, who, from the unfortunate prejudice against blacks, cannot live happily in their native land, and which has since become the asylum of the recaptured Africans taken out of the slave ships by the American cruisers for suppressing the slave trade, is becoming so interesting and important a community, that I beg to give a concise account of its present condition and its prospects, with the desire of attracting the benevolent regards of all Christian peoples, but particularly of the British nation, towards the young and rising State.

Liberia (the land of the free), on the west coast of Africa, is a place of refuge for those poor negroes who, not comfortably situated in their native country, have migrated from Virginia, Ohio, the Carolinas, Pennsylvania, Maryland, and other States of the Union. These negroes have been aided by the benevolence of the American Colonisation Society, at Washington, to remove to the coast of Guinea, where, after undergoing a variety of hardships and afflictions incident to settling in a savage region, they have formed themselves into a respectable commonwealth, numbering some 50,000 souls, of whom about 48,000 are aboriginal inhabitants of the country, and about 16,000 Americo-Liberians. Their form of government is that of a Republic—having an elected President, and two houses (Senate and House of Representatives)—of the legislature. The Vice-President and President are elected for two years, the House of Representatives for two years, and the Senate for four years. There are 13 members of the Lower House and 8 of the Upper House; each county sending two members to the Senate. Hereafter, as the population augments, each 10,000 persons will be entitled to an additional representative. The Vice-President must be 35 years of age, and have real property of the value of 600 dollars; and, in the case of the absence or death of the President, he serves as President. He is also President of the Senate, which, in addition to being one of the branches of the Legislature, is a Council for the President of the Republic, he being required to submit treaties for ratification and appointments to public office for confirmation. The President must be 35 years of age, and have property 600 dollars. The judicial power is vested in a supreme court, and such subordinate courts as the Legislature may from time to time establish.

Liberia is situated on that part of the coast of Guinea called the Grain Coast (most fertile in rice), having for its south-eastern boundary the San Pedro River, 78 miles east of Cape Palmas, and running along the coast to the mouth of the Shebar river, 125 miles north-west of Monrovia; it has about 600 miles of coast line, and extends back about 100 miles on an average, but with the facility of almost indefinite extension into the interior, the natives everywhere manifesting the greatest desire that treaties should be formed with them, so that the limits of the Republic may be extended over all the neighbouring districts. The Liberian territory has been purchased by more than twenty treaties, and in all cases the natives have freely parted with their titles for a satisfactory price. The chief solicitude has been to purchase the line of sea-coast, so as to connect the different settlements under one government, and to exclude the slave trade, which formerly was most extensively carried on at Cape Mesurado, Tradetown, Little Bassa, Digby, New Sesters, Gallinas, and other places at present within the Republic, but now happily excluded—except in a recent instance at Gallinas, under peculiar circumstances. The country lately devastated by the infamous slave traders, is now being culti-

vated and enriched by peaceful agriculture and extending commerce. It furnishes a home to the defenceless natives who have fled for protection from slavery and death, liable to be inflicted upon them by their own ruthless chiefs. The natives know that within Liberian jurisdiction they are secure from the liability of being seized and sold into slavery.

The original settlers landed in Liberia and hoisted the American flag on the 25th April, 1822, at Cape Mesurado, where Monrovia, the capital, was established, and they continued under the fostering care of the American Colonization Society until the 24th day of August, 1847, 25 years, when they were proclaimed a free and independent State, with the sanction of the parent Society, and were regularly installed as the Republic of Liberia. England and France soon welcomed this small state into the family of nations by making treaties of amity, commerce, and navigation with her. These friendly examples being imitated by other powers, it follows that Liberia is acknowledged, and has treaty relations with some of the most respectable States of the world situated in Europe and America. It is deeply to be regretted that the United States, the fatherland of the Liberians, has not yet acknowledged the young Republic. It is to be hoped that since the power has passed out of the hands of the pro-slavery party in America, that Liberian independence will soon be acknowledged by the 12th nation of the world. The little Republic of Africa will, no doubt, soon be acknowledged by the mighty Republic of America.

Though Liberia was established on the Coast of Africa as an asylum for the free coloured people of the United States, it was not intended to confine the object merely to the deportation of persons previously free. On the contrary, many slaves were emancipated expressly for emigration to Liberia, and a number of benevolent and kind masters (I will mention only one name, John McDonough, New Orleans), and particularly mistresses (I will confine myself to naming the three excellent women, Miss Margaret Mercer, of Virginia, Mrs. Reed, of Mississippi, and Miss Mattie Griffith, of Louisville, Kentucky, who manumitted all her slaves when she came of age, two or three years ago—this beautiful and noble minded young lady was in London last year), could be mentioned who not only made great sacrifices, but nearly pauperised themselves by giving up their property in slaves, and also by furnishing them the means of comfortably reaching the colony by a long sea passage, and providing for their welfare after their arrival in their future homes. Upwards of 6,000 persons were in this category, most of whom, and their descendants, have since become valuable and useful citizens of this little state, who if they had continued in the land of their birth would have remained depressed as an inferior caste, repulsed from the society of the white race, and excluded from all but the most menial and least lucrative employments. With the natural aspirations of free men, and finding all the circumstances surrounding them in their new homes so favourable for the development of the industry, talents, and enterprise they possessed, we have witnessed all the success which was to be expected. We find them changed from the careless, listless beings they were in America into the pains-taking, industrious, and energetic citizens of Liberia. It would be easy to mention the names of numerous persons of Liberia who would do credit, by their respectable characters, their wealth, and their general success, to almost any civilised community, who owed their prosperity exclusively to the education of circumstances they found in Liberia, but who would, if they had remained in their native land, under the prejudices and the depressing circumstances surrounding them, have continued mere drones and nobodies. These people were early taught to govern themselves. The white governors sent out by the American Colonization Society had the good sense to take pains to select the most respectable of the coloured people to aid in administering the affairs of the infant colony, and the training of Lot Carey, Elijah Johnson, John B. Russwurm, and

J. J. Roberts, and others that could be named, was so good that on the death of the lamented Buchanan, in 1841, (the last of the white governors) it was resolved that all in authority hereafter should be coloured persons, and Mr. Roberts was made the governor, and continued so for six years, and on the independence of the state being proclaimed, and the Republic of Liberia instituted, Mr. Roberts was elected President, and on three subsequent occasions he was re-elected President, thus serving eight years as chief of the Republic, and previously six years as governor, making a total service of 14 years as chief magistrate of Liberia.*

His excellent successor, the actual President, Stephen Allen Benson, came from Maryland at the early age of 6 years, and, having gone through all the varied vicissitudes, among others, of being a prisoner when very young among the aborigines, then being a successful merchant, then being a member of the Legislature as Senator, then Judge, then Vice-President of the Republic and, of course, President of the Senate, and occasionally Military Commander of the volunteer countrymen in resisting the attacks of the natives, became President of the Republic, and, having served 3 terms of 2 years each, was inaugurated for a 4th term last January, and, on the completion of 8 years of service as President, he will probably retire to his large coffee estate at Bassa, and hereafter some of my present audience may have the pleasure of partaking of probably the best coffee produced in the world from his plantation.

It is instructive to contrast the cheap and successful self-government of the Liberians with the expensive and not over successful government of white men in the Colonial establishments of the Europeans on the coast of Africa. White men, soon dying in the ungenial climate of Africa, require large salaries and frequent successors, whilst the blacks, living in a climate far more congenial to them than the temperate zone would be, are long-lived, healthy, and economical administrators of the simple laws of their own framing, which are well adapted to promote the prosperity of their countrymen.

Liberia has every advantage of climate and of fertility of soil, and of variety of production, to make it a rich and powerful nation. Every species of tropical produce thrives in this country. Rice is abundant, and is cultivated on the high lands as well as on the low grounds near the coast. Indian corn, sweet potatoes, cassada or cassava root, beans, peas, water melons, pine apples, oranges, lemons, guavas, mangoes, plantains, bananas, pawpaws, tamarinds, pomegranates, and a great variety of other edibles, afford ample supplies for the tables of the inhabitants and for the demands of shipping. Among other articles which already yield valuable exports, or are likely soon to do so, are coffee, sugar, cotton, ginger, pepper, indigo, ground nuts, arrowroot, palm-oil, ivory, camwood, and other woods for dyeing purposes, as well as for ship and house building, &c. Nearly all these productions are indigenous in this

* No more energetic, judicious, and truly respectable and successful chief of a government could have been found, if the world had been searched over, than Mr. Roberts has been. He came from Virginia, at the age of 20, and being educated by circumstances, though not very favourable for literary and scientific development, has proved himself all that his countrymen required in a chief magistrate, and, like the great Iron Duke (as Wellington is called by the *Times*) of this country, conscientiously performed his duty under all the remarkable conditions of his varied life. On retirement to the ranks of the people, he has again been called on to fill the vastly important office of President of the Liberian College and professor of jurisprudence. He has lately completed the erection of a magnificent college edifice, with the same energy, good sense, and success, which characterised his past career. Mr Roberts proves how much we are the creatures of education and of circumstances. He might have been a menial servant or a barber in Virginia, but he has become an historical character by removal to Liberia. Long may he live to enjoy the respect and grateful affection of his countrymen and the friends of his race.

country. The wild coffee tree may frequently be met with in the woods. It is the same species as that ordinarily reared in other parts of the world, but may be much improved by cultivation. Several of the inhabitants have applied themselves to this branch of agriculture, which may be carried on with smaller means than are required for the cultivation of sugar or cotton, though both of these articles, particularly sugar, have been produced with success. Specimens of Liberia coffee, which have been sent to the United States and to Europe, have been pronounced, by good judges, equal to the best received from Mocha or any part of the coffee-producing countries of the world. The civilised population of Liberia is, however, so small (Americo-Liberians only 16,000), that important exports cannot be expected until greatly increased capital, and a great addition from the free negroes of the United States, shall give a greater command of skilled and industrious settlers who will be fortunate in finding abundance of native labourers at the low rate of three dollars and rations per month all through the country. Liberia is already prepared to receive 7,000 or 8,000 American negroes per annum, and every year will give it increased ability to receive comfortably additional thousands, until 25,000 or 30,000 emigrants per annum will not be inconvenient. The United States has four millions of slaves, and half a million of free negroes. Liberia could receive all of these in the next 25 or 30 years with great advantage to both the American and the African Republics.

The charity and liberality of the Liberians have been taxed by the sudden and unexpected landing upon their shores of nearly 5,000 savages, taken from slave ships within a few months, but such has been the energy of the Government and the well-directed efforts of the well-disposed people of Liberia, that the sudden and unexpected addition to their population has been provided for most humanely, and with every prospect that these poor wretches, wrested from the hands of the infamous slave traders, will be reared up to respectability and useful citizenship. An important feature of this new immigration is that it consists principally of young people, mostly boys and girls under 20 years of age, who will be more readily moulded into civilized and useful inhabitants than if they had been of more advanced years. The American Government has lately made an arrangement to allow the Liberian Government 100 dollars per head for all the landed re-captives over eight years of age, and 50 dollars per head for all under three years. These poor creatures are carefully looked after in a moral, religious, and economical point of view. Already some of the Congos formerly landed from the detested slavers have become useful and successful citizens, some being even magistrates, members of the legislature, and missionaries.

The climate of Liberia is warm (the latitude of Monrovia is only 6° 19' north of the equator), but equable, and tempered by frequent rains and daily sea breezes. The year is divided into but two portions, known as the rainy season and the dry season. The rainy time commences the middle of May, and the dry season commences the middle of November. It should, however, be understood that this absolute distinction is in some measure to be qualified, as there are rainy days, and clear, pleasant days, in every month of the year. The dry season is the warmest, and January is the hottest month of the year—the average height of the thermometer usually being about 75°. The negroes from the United States do not find the heat oppressive at any season. It is a mysterious and unaccountable fact, that the climate which is fatal to the whites, is not only innoxious, but is congenial to the blacks. This is a benevolent provision of Providence. If white men could have lived in Africa, within the tropics, the whole continent would doubtless have long since been subjected, like America, to the domination of rulers of European origin, which has resulted in the extirpation of the aborigines. Many attempts have been made by different nations—Portuguese, Dutch, English, French, Danes, and Swedes—to establish settlements of white

colonies on various intertropical portions of the African coast, and all have failed from the same cause—the deadly nature of the climate. Yet, at Sierra Leone and Liberia coloured men, whose ancestors for 200 years had resided within the temperate zone, find the climate salubrious, and live as long as others of the race in America. All immigrants, however, have to pass, shortly after their arrival, through what is called the acclimatising fever. It is a bilious remittent fever, which usually passes into the intermittent form. The first settlers suffered severely from this disease, but now that its treatment is better understood, and the proper accommodation and attendance are provided, it has ceased to be so much dreaded as formerly. Two or three deaths usually happen out of every 100 emigrants who arrive, but it is observed that the fatal cases are almost always those of persons who were previously in bad health, or who neglected the simple precautions which are prescribed for new comers. In many cases, on the other hand, the immigrants find their health improved by the change of country. It is a remarkable fact that foreigners may visit this coast, and land at 6 or 8 o'clock in the morning and remain on shore all day, until 6 or 8 o'clock p.m., with perfect exemption from coast fever, if they only are careful to sleep on board of ship at night. It seems that African fever is contracted principally while asleep, or while exposed to the miasma which appears to be more noxious during night. There are numerous cases of foreigners being detained on shore at night, and for several nights at a time, who shut themselves up in a close room, with a little fire to expel dampness, and who escape entirely all deleterious effects of climate, except a little lassitude for a day or two.

There are no very large rivers within the present limits of Liberia. The two largest rivers are the Cavally, in the south-east, having water enough for vessels of 15 feet draft for 80 miles, and the St. Paul's in the north west, having a navigation of 16 miles for vessels of 11 or 12 feet draft of water, and having a course of 300 miles through a fertile and beautiful country. There are numerous small streams, some of which are half a mile wide at a distance of 50 miles from the ocean, but none are navigable for large boats more than 30 miles from their mouths.* Their currents are obstructed by rapids, which will make hereafter fine seats for water-power manufactories, and most of the rivers are capable of being much improved for navigation by engineering art. The rivers St. John, Junk, St. Paul, and Cavallay, are those running through the most fertile and well cultivated countries. The Junk and St. Paul countries are more famous for sugar cultivation, whilst the people upon the St. John are more addicted to coffee culture, though sugar grows well also. Cotton grows spontaneously all over Liberia, and only requires care to make it a great staple of export. It being of good quality and so near to the exhaustless market of Liverpool (compared with India and Australia), and freight being low, it will probably become a leading article of cultivation, and thus in time render England less dependent on the Southern States of the Union, thus tending to relieve those unhappy districts from the blighting effects of slavery—the greatest of all evils—the sum of all villainies. The Liberians, encouraged by their kind friends in England, particularly the Cotton Supply Association of Manchester, are paying greater attention to the production of cotton, and in time large exports to Liver-

* The other rivers are Great Cape Mount River, Little Cape Mount River, Stockton River, Sesters River (usually called River Cass, navigable for 12 feet craft for 40 or 50 miles interior); Sanguin River, Shebar, St. John's, Junk, Gallinas, Solyma, Manna; Sinou River, Mesurado, and Booma. The ports of entry and delivery are, Robertsport, on Grand Cape Mount River, in Montserrado County; Monrovia, Cape Mesurado, Montserrado County; Marshall, on Junk River, Montserrado County; Buchanan, on St. John River, Bassa County; Greenville, on Sinou River, Sinou County; Harper, Cape Palmas, Maryland County.

pool will reward the Lancashire people for their fostering care of this vital interest of commerce.

For political and judicial purposes, the Republic is divided into counties, which are further subdivided into townships. The counties are four in number, Montserrado, Grand Bassa, Sinoe, and Maryland. The townships are commonly about eight miles in extent. Each town is a corporation, its affairs being managed by officers chosen by the inhabitants. Courts of monthly and quarter sessions are held in each county. The civil business of the county is administered by the four superintendents appointed by the president, with the advice and consent of the senate. The county system of government is capable of indefinite extension over new districts of territory that may be acquired, giving all the advantages which local self-government affords to the inhabitants, added to the conservative and effective metropolitan governmental benefits of the central power of the entire republic. The system has thus far worked well, and it may be in time worthy of imitation by other countries, provided the experience of a few more generations shall prove its efficiency.

Monrovia, the capital of Liberia, so named after Mr. Monroe, the fifth President of the United States, a great friend to the settlement of Liberia, is beautifully situated on Cape Mesurado,* about 75 feet above the level of the Atlantic Ocean, in 6.19 North latitude, and 11 deg. West longitude, has a population of about 3,500 souls. Its position is most happy, having, by means of the Mesurado and Stockton, and the St. Paul's and the Junk rivers, the greatest facilities for navigable communication with the interior. Besides being the executive, judicial, and legislative seat of government, it is well furnished with schools, churches, missionary establishments, a newspaper called the *Liberia Herald*—dating back to 1826—a college, and other evidences of advancing civilisation and refinement.

The new college just completed is a magnificent edifice, situated on a most commanding site, on a 20 acre field for play-grounds granted by the Government, and is due to the liberality of the people of Boston, United States, who not only furnished the funds for the construction of the building, but also have presented a library, geological cabinet, and otherwise endowed it. The Government has also granted 4,000 acres of land, of which 1,000 acres are in each of the four counties of the Republic. This land will become valuable in the course of time. Mr. Ex-President Roberts, of Liberia, is the president of the college, and is a Professor of Jurisprudence and International Law. The Rev. S. Alexander Crummell, a graduate and M.A. of Queen's College, Cambridge, England, is a Professor of Moral and Intellectual Philosophy, the English language and its literature. The Rev. E. W. Blyden, a young man of great energy, talents, and usefulness, now the Principal of the Alexander High School for Boys, in Monrovia, and an experienced teacher, is the Professor of Greek and Latin languages and their literature.

To show how entirely sectarian principles are disregarded in Liberia, I may mention that Mr. Roberts is a Wesleyan Methodist; Mr. Crummell is an Episcopalian; and Mr. Blyden a Presbyterian; and there is a prospect of their acting harmoniously together in the advancement of true religion, and the civilising influences of science and literature which may be expected to flow from the teaching of these excellent men. The greatest benefit to the rising generation is expected from this college, particularly as it will prevent the necessity of sending the youths to England and the United States for instruction. Measures are being taken for a superior education of girls, which has hitherto been neglected, to the injury of the State, for women, as mothers and sisters, exerting a great influence over society, particularly in attending to the

youth of both sexes, are, when they are competent, the greatest social improvers. I hope some liberal Englishmen will emulate the liberality of the Bostonians towards the boys' college, by supplying the means for the High School for girls at Monrovia, which should be liberally endowed and made as effectively useful as possible.

The inhabitants of Monrovia are great Sabbatharians. They go constantly to church; and so closely do they respect the Sabbath, that when Prince de Joinville, the captain of the French frigate *Belle Poule*, came into their port on Sunday, and offered to salute the flag, it was declined, because of their unwillingness to have the Sabbath desecrated. So also when Captain Eden, of one of Her Majesty's ships, was ordered to call at Monrovia, to salute the Liberian flag, he happened to arrive on Sunday morning, and communicated to the President that he wished to salute the flag, provided it would be returned, when he was informed that it could not be done on that day, being Sunday, but it would be returned on the following day (Monday). Captain Eden, being pressed for time, saluted on Sunday, with the understanding that the salute would be returned to the first British cruiser that should come into port. The conscientious British captain performed his duty, and the Monroviens performed what they considered to be their duty; and I hope both will be justified by the opinions of their respective countrymen, as far as they have done what they believed to be right.

Such of the aborigines as have for three years previously adopted and maintained civilized habits, are entitled to the elective franchise, and a considerable number exercise this privilege. There are native magistrates and jurors. Two of the magistrates serving in Bassa county, and who act as associate justices in the monthly courts, are Bassa natives.

It is the policy of the Liberian government to induce American immigrants to settle in the interior—some fifteen, twenty, or thirty miles from the coast—where the surface of the country is undulating and hilly, and more healthy for those freshly arrived than the coast country. Carysburg, White Plains, and Clay Ashland—are some of these interior settlements from which good results have already been experienced. When a new settlement is formed, it is customary for some five, six, seven, eight, or ten families of the old residents of Monrovia, or other old towns, to accompany and guide the strangers, and indoctrinate them into the mysteries of their newly commencing Liberian life. This is a wise course. Each settler, on his arrival in the Republic, is entitled to draw a town lot, or plantation. If a town lot be drawn, he is required to build a house, of brick, stone, or other substantial materials, sufficient for the accommodation of all the family of the proprietor within two years, and he receives a fee simple deed. If a plantation be drawn, two acres must be cultivated within two years to get a fee simple deed. Every man may have a town lot, or five acres of farm land, together with two more for his wife, and one more for each child that may be with him, provided that no family shall have more than ten acres. Women, not having husbands, may each have a town lot, or two acres of farm land, on their own account, and one acre on account of each child. Unmarried men of the age of 21, arriving from abroad, on taking the oath of allegiance, shall be entitled to draw a town lot or five acres of farm land the same as family men. There is a penalty of five dollars for cutting down palm trees, except by the fee simple proprietor. Each proprietor of farm lands must show his boundaries by erecting posts at the angles of the same.

The English is the mother tongue of the Liberians, and they are extending its use along the coast and into the interior. Nothing is more common than for the native chiefs and the head men and other important persons among the tribes within the jurisdiction of Liberia, and even far beyond, to place their sons at the early age for three, four, or five years in the family of the American Liberians expressly to learn English and to acquire civi-

* The other principal Capes are Cape Mount, in 7 deg. north and 10.48 west; Cape Palmas in 4.23 north and 7.43 west longitude, Greenwich Observatory. There are most useful and very elevated lighthouses on Cape Mesurado and Cape Palmas, which are a great assistance to the navigation of the coast.

lised habits. Among the natives, to understand English is the greatest accomplishment and advantage; and with some of the coast tribes, a knowledge of English is beginning to be regarded as a necessary qualification for the ruling men of the chief towns. Our language has become the commercial medium of communication throughout not only the African Coast, but other parts of the world where ships and steamers carry the civilising influence of commerce, and in time it will become universal.

There is no standing army, but all males between the ages of 16 and 50 are compelled to serve in the militia, except clergymen, judges, and a few other privileged persons. This force is well drilled, and has the 1,500 muskets kindly presented by the present Emperor of the French, and it has proved itself to be eminently qualified to defend the country, and to make the government respected among all the neighbouring tribes and nations of the Coast of Guinea.

The navy consists of one vessel, a schooner of five guns, kindly presented by her Majesty's Government, and of an advice boat, the steamer *Seth Grosvenor*. These vessels are most usefully employed in suppressing slave trade, and in acting as "Guarda Costa."

The revenue of the republic for the year ending the 30th of September, 1861, was 149,550,11 dollars. The expenditure was for same time 142,831,11 dollars.

A portion of the receipts and expenditure arose from the recaptured Africans landed at Liberia, and supported by the Government until they can be placed out to take care of themselves.

The import and export duties are the great sources of income. The total product of import and export duties was 44,000 dollars.

Expenses for legislature were	4,500 dollars.
„ For Judiciary.....	7,900 dollars.
„ For Salary or Civil List	6,400 dollars.

The Liberians are under great obligations to the British Government and British people for their kind regards and useful efforts to encourage and aid them in the great task of building up a negro nationality on the coast of Savage Guinea. The British Government* were the first to acknowledge the independence of Liberia, were the first to present them with a small vessel-of-war to act as "Guarda Costa" and to aid in suppressing the slave trade, and have for many years done all in their power to countenance and foster the growth of this youthful state. The British people also have manifested the most friendly and kindly feelings towards this young people. The late Duke of Sussex, Capt. Rosenberg of the Royal Navy, and Lord Bexley were early kind friends to Liberia, as well as the eminent Thomas Clarkson, and also Dr. Thomas Hodgkin of the same past age, but this last mentioned gentleman continues to the present day one of the warmest of Liberia's friends. I must also mention, as peculiarly dear to Liberians, the name of Gurney. The late philanthropic and benevolent Samuel Gurney, and the present Samuel Gurney, and Dr. Thomas Hodgkin, are excellent examples of the practical and useful efforts made by members of the Society of Friends to extend social improvement over the world. Two most promising youths from Liberia are at present under the charge and at the sole expense of Mr. S. Gurney, who is giving them the best possible education to make them useful citizens on their return home. Never does a month go round that I do not receive useful books, periodicals, newspapers, and other food for the mind, from Mr. Gurney, Dr. Hodgkin, and other kind friends of the coloured race, to be sent to the libraries and reading-rooms of Liberia. The good people of Edinburgh, also, are manifesting great

kindness by educating two most promising young men as medical missionaries, who, on their return to Liberia, will spread the benign influences of civilisation and Christianity over the aboriginal population of the republic. I must mention John A. Callender, Esq., and the Rev. Dr. Johnston, of Edinburgh, as the most forward in this labour of love towards these young Liberians, one of whom will, I hope, be rewarded by taking off the prizes awarded, in the Edinburgh University, for successful scholarship and devotion to study. Another benefactor of the republic must be mentioned; Martin Farquhar Tupper, the popular poet, and author of *Proverbial Philosophy*, who, many years ago, granted a large gold medal to be worn for one year by the most successful writer as essayist, historian, &c. The prize is awarded by a council of respectable citizens, the President, Secretary of State, and other public functionaries being *ex-officio* members of it. Great good has already been effected by this judicious stimulus to literary and scientific efforts, which will be more and more efficacious as population, wealth, and refinement increase, and intellect is developed.

The principal materials for building purposes are wood, stone, and brick. The forests abound in suitable timber for houses, as well as ships, but for the reason that wood houses are infested with a destructive little insect, locally known as "bugabug," stone or brick-building materials are preferred by those who can afford the expense. Excellent blue and grey granite, and hard sandstone, as well as clay, suitable for bricks, abound, and innumerable oysters, clams, and snails furnish shells, out of which lime for cement is manufactured.

A great variety of excellent fish are found in all the Liberian rivers, of which the mullet, angel fish, and white boys are preferred. From the sea are taken the barracouta, mackarel, cavalla, and a great number of other fish for frying.

Iron ore abounds all over Liberia, but as yet no copper, tin, zinc, lead, silver, or other useful minerals have been discovered in Liberia. Some gold and some indications of coal have been found, and I hope, when the four young men now in Edinburgh and London receiving education, return home, they will discover copper, lead, coal, and other useful minerals, and also be able to construct the canal or railway between the Junk and Mesurado Rivers and the breakwater at Monrovia, and other engineering works of prime necessity and utility.

Many persons say that Liberia is a failure—that she has not advanced as she ought to have done, and that the results are far less than were expected. But if we consider the small expenditure upon Liberia—millions of pounds have been spent upon Sierra Leone, thousands of dollars only upon Liberia—and that only 16,000 Anglo-Saxon negroes have left the United States and settled on the coast, and that they have been far more numerous and prosperous, and progressive, in the forty years since they made their homes in this savage country than were the English settlers in Virginia in sixty years after they landed, and have since become a mighty nation of 32,000,000 souls, what may we not expect from Liberia if the four and a half millions of American negroes living most unhappily in their native land should migrate in the next thirty years to the "Land of the Free" on the West Coast of Africa? There can be no doubt that Liberia is far better adapted for the American negroes than Hayti, which has the Catholic religion, and foreign language, manners, and customs—the French; whilst the Liberians have the same Protestant religion, the same language, and the same manners and customs which they left behind them in America. The negroes of the United States should desire to create a flourishing Anglo-Saxon-Negro nationality on the coast of their fatherland, which has been so well commenced by the pioneers who for 40 years have been preparing the way for their comfortable residence in Liberia.

The American Liberians, in their Declaration of Independence, use the following language to describe their fortunate change of circumstances by migrating from the

* Liberia has since been acknowledged by France, Belgium, Prussia, Brazil, Hamburg, Italy, Bremen, Denmark, Lubeck, Portugal, and soon will be by the United States. With most of these States treaties of amity, commerce, and navigation, have been made, and treaties are being negotiated with other governments.

United States to this new and improving country. They say:—"Liberia is already the happy home of thousands who were once doomed victims of oppression, and thus far our highest hopes have been realized. Our courts of justice are open equally to the stranger and the citizen for the redress of grievances and for the punishment of crime. Our numerous and well-attended schools attest our efforts and our desire for the improvement of our children. Our churches for the worship of our Creator, everywhere to be seen, bear testimony to our piety and to our acknowledgment of his providence. The native African, bowing down with us before the altar of the living God, declares that from us, feeble as we are, the light of Christianity has gone forth; while upon that curse of curses, the slave trade, a deadly blight has fallen as far as our influence extends. Therefore in the name of humanity, virtue, and religion—in the name of the Great God, our common Creator and our common Judge, we appeal to the nations of Christendom, and earnestly and respectfully ask of them that they will regard us with the sympathy and friendly consideration to which our condition entitle us, and will extend to us that comity which marks the friendly intercourse of civilized and independent communities."

Then follows the Constitution, one section of which declares, "That there shall be no slavery within this Republic, nor shall any citizen or any person resident therein deal in slaves, either within or without its bounds, either directly or indirectly."*

DISCUSSION.

Mr. BENSON (President of Liberia), responding to the call of the chairman, said—After so lucid a statement made by the author of the paper, respecting the origin, objects, progress, and present condition of Liberia, though of necessity made somewhat in general terms, he deemed it unnecessary to tax their time and patience with any lengthy additional remarks. He had, therefore, risen simply to bear testimony to the correctness of the statements made by Mr. Ralston, and to assure them that many of the facts stated had come within the compass of his own observation and knowledge. The object of the pioneers who first emigrated to Africa forty years ago, to found the colony of Liberia, as well as many of those who followed them at different periods, was not restricted to the amelioration of their own individual condition, de-franchised and almost brutalised as many of them had been in the land of their birth. This only formed one of the motives by which they were influenced. They felt it to be their duty to co-operate with philanthropists in the United States and elsewhere, in establishing a civilised negro government and nationality in their fatherland, first, for the purpose of ameliorating their own condition; secondly, of affording an asylum, a respectable and comfortable home, for such of the African race in other countries, as might be disposed to emigrate thereto; and thirdly, of imparting the inestimable blessings of civilization and Christianity to the millions of aborigines of that benighted continent. The progress Liberia had hitherto made in securing those cherished objects, and her future prospects of realizing a consumma-

tion of them, could be reasonably inferred from the statements made by Mr. Ralston. It was true that hitherto the efforts made by those engaged in providing this asylum had not been duly appreciated by the coloured race generally in foreign lands, especially in the United States; but Liberians had not been discouraged thereby. The hesitation hitherto shown to emigrate to Liberia was regarded by its inhabitants as extremely fortunate. A larger influx of immigrants into Liberia, before sufficient experience had been acquired in conducting its government and institutions, and in developing the resources of the country—considering the quality of the majority of those who had hitherto immigrated—would have greatly endangered the success of the Republic. Thus, providentially no doubt, the spark of hope that had been kindled in Liberia had been kept alive. Liberia, by the productive industry of her civilized population, as well as by other means, had been hitherto, but especially within the last six or eight years, undergoing a preparation for the reception annually of a large number of emigrants. During the last six or eight years its productive capacity had been satisfactorily tested on a small scale, so that no Liberian now entertained a doubt but that the husbandman, or one prosecuting any other branch of industry, suited to a young but rising country, would be abundantly rewarded by the fruits of his labour. Freemen, freewomen, free lads and lasses, would voluntarily rise at the dawn of day in the rural districts of that country, and cheerfully repair to their fields of sugar cane, coffee, cocoa, rice, cassava, potatoe, &c., and labour for themselves in friendly competition, more steadily and effectually by far, than if they had a lazy overseer behind them, with the brutal lash compelling them to perform unrequited labour. Such cheering scenes of thrift, cheerfulness and plenty might be seen every day in Liberia, and this accounted for the fact alluded to by Mr. Ralston, in his paper, that Liberia was able to sustain, in part of 1860 and 1861, without inconvenience, until provision was duly made for them by the United States Government, a population equalling one-fourth of her entire civilised population, suddenly landed on her shores from prize slave-ships, captured by American cruisers. Liberia was now, under God, capable of sustaining herself, even though she should not receive another coloured emigrant from abroad. The inhabitants could build up and sustain the Republic by the natural increase of the present population. They had an abundance of raw material in Liberia and on the Continent, consisting of the aborigines, whom they could polish and make suitable, each to occupy creditably his place in the great political superstructure they were endeavouring to rear. Young, poor, and weak as Liberia had been and was, she had succeeded, with the aid of foreign missionary associations, in civilizing hundreds of those sons and daughters of the forest, and many of them could be exhibited on that day in Liberia, as good, honest, intelligent Christian citizens; and among them were many serving as ministers of the Gospel, magistrates, jurors, school teachers, and constables—men and women who would be respected and admired in any rational civilized community. And tens and hundreds of thousands more would be civilized and Christianized in the same way, only more rapidly, in proportion to the extension of the political jurisdiction of Liberia on that continent, and the increase in the civilized population. Thus, while they were desirous, and even urgent, that their coloured friends and kindsmen, especially in the United States, should emigrate to Liberia—as in their opinion the best home that could be found for them—let it not for a moment be imagined that Liberia's progress and perpetuity entirely depended on such immigration. Even if they should refuse to immigrate there, Liberia would prosper; but if they took the wiser course, and joined the Liberian community, it would be the means, no doubt, of promoting the success and progress of that Republic with greater rapidity. Perhaps he should be looked upon as a fanatic by some when he asserted that he regarded Liberia

* Captain Robert Stockton, of the American war ship *Alligator*, and Eli Ayres, M.D., made the treaty for Cape Mesurado, 15th day of December, 1821, with King Peter, King George, King Zeda, King Long Peter, their Princes, and head men (the English and French had been trying for Cape Mesurado for 100 years, and had not been able to procure it), who paid down 6 muskets, 1 box of beads, 2 hogshads of tobacco, 1 cask of gunpowder, 6 bars of iron, 10 iron pots, 1 dozen knives and forks, 1 dozen spoons, 6 pieces of blue baft (cotton cloth), 4 hats, 3 coats, 3 pairs of shoes, 1 box of pipes, 1 keg of nails, 3 looking glasses, 3 pieces of kerchiefs, 3 pieces of calico, 3 canes, 4 umbrellas, 1 box of soap, 1 barrel of rum; and to be paid hereafter 6 bars of iron, 1 box of beads, 50 knives, 20 looking glasses, 10 iron pots, 12 guns, 3 barrels of gunpowder.

as a child of Providence. The great difficulties and disadvantages under which they had had to labour from the first planting of the colony, had taught them the valuable lesson of trying to do their duty in the present, and of trusting in God for the future. Experience had abundantly taught them that this was an infinitely valuable lesson; and acting in harmony therewith, there was safety under all circumstances. Even now, events beyond human control, in connection with the negro, were transpiring, and would continue to transpire, in the Western hemisphere, which were revealing, and would continue to reveal, the Divine purpose respecting the much-abused negro race, and which should be sufficient to teach all peoples that their deliverance and elevation were not far distant. These events, in connection with other circumstances, to say the least, evidently indicated that a brighter day of hope for the negro was beginning to dawn—a hope which no human power, cupidity, sagacity, nor avarice, would be able finally to crush. Liberia had inflicted a death-blow upon slavery co-extensively with her political jurisdiction. The government and people of Liberia were uncompromisingly antagonistic to slavery and the slave traffic, and were determined to tackle with it at any hazard, whenever and wherever it should attempt within their dominion to show its deformed head. They were determined that the foot of the dealers in human flesh should not pollute an inch of Liberian soil—a soil that had been consecrated to personal, civil, and religious liberty. And he could assure those who heard him that in making these assertions he did no more than give expression to the sentiments of the people of Liberia, who were united on the subject; for, failing to secure and perpetuate the great blessing of liberty, life itself would be no longer desirable to them. He desired, in conclusion, to express the assurance that there was nothing of which he could conceive that would tend more to encourage and confirm his fellow-citizens and himself on their return to Liberia, in that cherished purpose, than his present visit to England, where they had been so highly gratified by hearing expression given so generally to kindred sentiments, and where he had heard in all circles (and they have been many) in which he had had the pleasure of socially mixing, the greatest solicitude for the success of Liberia, and for the welfare of the coloured race to which he belonged.

Mr. FULLER (of Sierra Leone) said he was not acquainted with Liberia, but he believed the negroes of that country were in a more advanced state than those of Sierra Leone. The latter, however, had had greater advantages than were possessed by the people of Liberia. They had always had schools and the best of teachers, from the time of the colony being settled. But there was one thing which had proved a bane to Sierra Leone, that was, if he might be excused for saying so, the presence of some of the Europeans who had been sent out there, and who had set such an example to the natives, that he could not but think it would have been better if they had remained in England; and if the natives were to form their opinions of Englishmen in general from some of those whom they had seen in the colony, it would be a very bad opinion indeed. However, when he came to this country, and saw the good feeling which prevailed towards the negro race, and the desire that was everywhere expressed for their elevation in the social scale, he felt very thankful to the people of England upon the whole. Liberia was no doubt a very promising country, and one which he hoped to see in a short time raising its head amongst the great nations of the earth; and from all they had heard of that state that evening, he thought they must come to the conclusion that the negro was as capable of education, and of being raised in the social scale, as any other portion of the great human family. He would express a sincere hope that this country would do all in its power to advance the republic of Liberia, and would take every means to promote the elevation of the negro in the social scale.

Colonel O'CONNOR (Ex-Governor of Gambia) expressed

the deep interest which he felt in this subject, and his anxiety to attend the meeting, at which he had had the opportunity of seeing his excellent friend, Mr. Roberts, the ex-president of Liberia. Whilst bearing his willing testimony to the great excellence and value of the paper which had been read, he was, nevertheless, happy to have the opportunity of contradicting or modifying the statements it contained with regard to the alleged mortality amongst the governors of our African colonies. It was true that the picture had been presented to him of one governor going out to supply the place of one who had died, and another being *in petto* ready to succeed him; but he was happy to say, although several governors of Sierra Leone and Gambia had fallen victims to the climate of those countries, there were, nevertheless, a great many still living, after having passed through their period of office. Colonel O'Connor mentioned the names of several governors who were still living, amongst whom were Governors Kennedy and Hill. The same might be said with regard to the colony of Gambia. Two of his predecessors were still alive, and he believed he might safely say that he himself was still alive. With reference to Liberia, everyone who had been on the coast of Africa must feel the most lively interest in it. During the time he was governor of Gambia he ruled quietly and easily, and the natives made rapid advances. There were amongst them merchants of high standing and ability, some of whom sought admission into his council, but he could not admit them, however desirous he might have been of doing so, because it was contrary to the rules of the colony. He might be allowed to express a slight difference of opinion from Mr. Fuller. He (Col. O'Connor) regretted if, during that gentleman's experience in Sierra Leone, that colony was under the government of such men as he mentioned, but he could point to Governor Hill, and to others who had endeavoured to do their best for the welfare of the colony, and the benefit of whose rule was still apparent; and for his own part, however much his power might have fallen short of his will, he had certainly laboured honestly and earnestly to govern well.

Mr. ROBERTS (Ex-President of Liberia), expressed his gratification at the deep interest which had been manifested in the little republic of Liberia. The Consul-General had been pleased to refer to him in a flattering manner, with regard to his connection with that colony. He had resided in Liberia thirty-three years. When he was in the State of Virginia, at the age of twenty years, he felt that if he remained in the United States he could never arrive at that position which white men occupied in that and other countries; therefore he determined to seek employment where by good conduct and energy he might gain that respect which was due to a *man* everywhere. He arrived in Liberia in 1829, and within the present jurisdiction of that colony there were then annually exported no fewer than from 30,000 to 40,000 slaves, but through the energetic measures adopted by the republic, with the efficient aid of Her Majesty's officers, the slave trade had been extinguished for 600 miles along that coast. They had always looked to the British Government and people for assistance and protection, when they were scarcely permitted to look for it elsewhere. Liberia had had many difficulties to encounter. The colony had been formed by a people who had had few advantages for improvement, especially in that which was calculated to fit them for the political management of their own affairs. Under those circumstances they remained under the control of the American Colonisation Society up to the year 1847. At that time, a political question having arisen between Liberia and the British Government with regard to commerce, it was necessary that the colony should assert its claims to political independence, which was done in 1847; and he was happy to say the British Government was the first to acknowledge the independence of the colony. Other European governments followed in that acknowledgment. Since then they had received from Her Majesty's government the kindest treat-

ment, and everything had been done to assist them by Her Majesty's officers, both naval and military. He had great pleasure in referring to the interest which had been shown in this republic by Colonel O'Connor, who was ever ready to assist them in their need. He was sure the meeting must have been gratified by the facts which were conveyed by the paper, and also by what had fallen from President Benson and Mr. Fuller, and his Excellency the late governor of Gambia.

Mr. G. F. WILSON, F.R.S., said one of the speakers had called upon the people of this country to do what they could to advance the interests of the republic of Liberia. He begged to call attention to a means which the colony itself had just taken to advance its own interests. It had been his duty a few days ago, as member of a jury, to inspect the products sent from Liberia to the Great Exhibition; and he was sure all who took an interest in that country would be pleased to hear that it had sent a most interesting and valuable collection of its products, extremely well arranged.

Mr. JOHNSON (Secretary to President Benson) added some remarks upon the present condition and future prospects of Liberia. He said, although they had a comparatively small territory, they had no desire for aggrandizement, except for the purpose of affording means of emigration to their brethren, and civilising the native tribes of Africa. The geographical position of the country rendered it peculiarly adapted for that work. They had sometimes been obliged to resort to the use of arms for the chastisement of their brethren of the coloured race, but there were only two instances in which they had done so; the first was for the suppression of the slave trade, and the second was to chastise them for the barbarous murder of some of the citizens of the Liberian republic. Having referred to the anomalous position which the colony formerly held with regard to the United States, he joined his acknowledgment with those of Ex-President Roberts to the British Government as having been the first to recognise the independence of the Liberian republic, and for the assistance which it had invariably extended to that country, to which, he said, much of its present prosperity was owing.

Captain CLOSE, R.N., said, whilst he had command of the northern division of the naval squadron on the Coast of Africa, amongst other instructions he was especially charged to render every assistance to the Liberian government whenever they required his services. This was sufficient to prove the great interest which the British Government took in that state. He paid a visit to Liberia whilst Mr. Benson was President, and he was fortunate enough to be there at the time when the annual inspection of the school children took place in the presence of the president and government officials. The scene which he then witnessed was most interesting; the assembling of the children to the number of 800 or 900, the marching with banners, the hymns sung, and the general proceedings of the day reminding him of similar anniversaries which he had witnessed in his father's schools at Cheltenham. On the outside of the circle of children were assembled a large number of negroes, who had recently been rescued from a slaver by an American vessel, and landed in the free republic. Great difficulties had been met with in the suppression of the slave traffic, until the Liberian government had obtained possession of the territory in the vicinity of the Gallinas river. At that time he had pointed out, in his despatches to the English government, the great importance of that territory being added to the republic, and since its acquisition the slave trade had been annihilated, and the cruisers formerly employed there were available for the surveillance of other parts of the coast. With reference to what had fallen from Mr. Fuller as to the character of some of the former governors of the African Colonies, he would say, as regarded Colonel O'Connor, Mr. Hill, and others, they were unquestionably the right men in the right place, and the retirement of the latter gentleman from the governorship of Sierra Leone was, in

his opinion, the greatest loss the colony could have sustained.

Mr. Ex-President ROBERTS said it might be a matter of surprise how the small republic of Liberia could do more towards the suppression of the slave trade than the British squadron. The reason, however, was this,—the squadron could only capture the vessels at sea when they had a cargo of slaves on board, and for many years the British vessels cruised off the coast without being able to suppress the slave traffic, which was carried on at the establishments in the vicinity of the Gallinas, but as soon as the republic obtained possession of that territory the slave depôts were destroyed, and an end was put to the traffic in human flesh.

Dr. MACGOWAN said, what most excited the surprise and admiration of a thoughtful foreigner in this country was the number and income of institutions which were supported by voluntary contributions—unless that foreigner was of British ancestry, when he would see in them nothing to which he was unaccustomed. Now Liberia was a monument of this kind, and one on which Britons as well as Americans could look with complacency. About the time that Clarkson and Wilberforce commenced their labours for emancipation in the West Indies, American philanthropists devised the scheme of African colonization, which aimed both to suppress the execrable slave trade and to promote the manumission of slaves. To the success of this enterprise the British government lent effective aid, as the Consul-General of Liberia had just informed them. It promptly recognized the claims of the little State to sovereignty, a claim which was disregarded by the United States until the present session of Congress—when the baneful influence of slavery could no longer thwart the philanthropy of American citizens. The recognition of Liberia had passed in the Senate, and was only one of the many noble deeds of the present chief magistrate of the United States. That same dire influence being no longer operative, the right of search had been conceded, and thus a heavy blow struck at the infamous slave traffic, so inimical to manufacturing and commercial interests. It could not however receive its fatal blow until France and Spain honestly join in the enterprise. The history of Liberia would throw light on the subject of colonisation and self-government. It had been affirmed that the Anglo-Saxon race was the only one fitted for successful colonisation and for the free exercise of the franchise, but that those qualities were not distinctive of race was demonstrated by the Africans in Liberia. They saw that piety and intelligence were all that was required for the formation of thrifty colonists and good citizens. This experiment had taught us that civilised man—when not emasculated by statecraft, nor etiolated by priestcraft—was competent for self-government.

Mr. CRAFT (from Georgia), responding to the invitation of the chairman, said, having been called upon to address the meeting, he could not refrain from expressing his deep sympathy with the race with whom he was identified. He was descended from parents and grand-parents who were slaves in the United States; and up to the age of 23 years he had been himself held as a slave, until he was urged, by the sense of his moral and physical degradation, to make his escape from the slave states to the free states of America; and finally to England, where he had resided and carried on business for the last ten years. He was now about to give up his occupation to return to Africa, for the purpose of joining in the work of promoting civilization and Christianity amongst his benighted brethren. He felt deeply indebted to the noble lord in the chair for the interest he had taken in this subject, and he hoped the society of which his lordship was president would be the means of doing much good for the African race in their own benighted land. He hoped President Benson, aided by the British Government, would not shrink from giving a little wholesome advice to the King of Dahomey. He was not an advocate for waging war; but he thought

if physical force was warranted in any case, it was in that of the King of Dahomey. He would express his gratitude to the people of this country for the deep interest they had taken in the welfare of the African race, and he hoped the time would soon arrive when the people of that land would enjoy the rights and privileges which civilisation and Christianity were calculated to confer.

MR. JOHN DILLON said it was not an unusual thing, in discussing the products of a particular country, to exhibit examples of those products. That had been done in a remarkable manner that evening, but it was not alone that they had exhibited before them samples of the coffee and cotton of the country, but they had been also shown the *men* of the country, of whom they could judge for themselves. He had listened with surprise to the language which had been addressed to them that evening by the gentlemen of the African race. They had all, no doubt, in their minds some lurking feeling that the negro race was incapable of the same degree of intelligence and excellence as the white race. The example they had had that evening must have dispelled that idea entirely. They had seen and heard men who had expressed their views not only with great truth and force, but with singular grammatical correctness, and even elegance, and in a manner which showed that they themselves fully comprehended and felt what they expressed. He could say, for himself, he should leave that room with a more favourable feeling, and with a stronger predilection towards that injured race than he had when he entered it, and he believed that would be the case with all present. He would not occupy the time of the meeting by common platitudes upon the rights of man and the maintenance of those rights, but he would say he felt hopes for the negro race that he had never entertained before. There was one thing much in their favour, namely, that this colony of Liberia supplied that which had been long wanting in the world. It was one point to secure the emancipation of the slave; but it was another thing to provide him with a proper asylum after his emancipation, and he trusted that want would be found to be supplied in this republic. It was only on the previous day he had met a gentleman from Africa, who was at once a merchant and a missionary. He was accompanied by three of his daughters, who had been for some time in this country for the purposes of education. He had hoped to have induced them to attend the meeting that evening, but other engagements prevented their doing so; otherwise it would have been a great gratification to have seen the meeting attended not only by several gentlemen of the African race, but also by three negro ladies, who would, both by their appearance and manners, have shown that they, like their male friends of that race, were worthy of being admitted to European society of the highest class. If so humble an individual as himself might be allowed to do so, he begged to express, on behalf of the English ladies and gentlemen present, their satisfaction at the progress the Africans were capable of making, their gratification at hearing the statements that had been made that evening, and their wishes for the future prosperity of this little state.

MR. DEWEY referred to the earlier efforts of the American Colonization Society, which had resulted in the settlement of this interesting colony of the negro race, making especial allusion to the exertions of Mr. Mills and Dr. Milner—the latter a distinguished minister, and friend of the cause of Africa. At first the efforts of those philanthropic men seemed likely to produce no good results, but they, after much difficulty, had succeeded in reassembling the committee of the Institution at New York, and under their auspices the work of emigration had been carried on with success. He had seen that evening the realisation of his hopes respecting that colony, and he begged to express his thanks to the people of this country for the way in which they had befriended this unhappy race in the time of their greatest need.

The CHAIRMAN said he was sure they would readily accord to Mr. Gerald Ralston their best thanks for the able paper he had read that evening, as well as for having initiated a most interesting discussion upon Africa and Liberia. The American Colonisation Society had been in existence forty years. They knew that for a long time, like all young colonies, Liberia had to fight its way through difficulties, privations, and trials. There was scarcely a flourishing colony of this country which, in its early formation, did not have to go through similar trials; but in the course of time it acquired a position of considerable importance. Liberia was now the point to which a large portion of the coloured population of America were looking. He had always said that the African race was capable of civilisation, and would ultimately be civilised, but, with the help of Providence, this would be effected by the means of its own children. It would seem that Africa could be won only by Africans themselves. It was a country unsuitable to European constitutions, and there were comparatively few persons who, by adopting habits which enabled them to withstand the effects of the climate, could live for any length of time in that country: but Africa was essentially the country for Africans, and he was convinced the true policy, both of this country and of America, was to encourage as much as possible the emigration of the coloured people in America to Africa. He would say, let them find half a dozen Liberias; let the people carry with them all the civilisation they had acquired in America, and all their practical knowledge of cotton, sugar, and tobacco; let them go and till the soil of Africa and produce those articles which were so much required in England. We were suffering from a dearth of cotton in this country, which was brought about principally by the failure in the supply of the slave-grown produce of America, owing to the sudden changes which had taken place in the political condition of that country. The enormous demand from this country must be met from some source or other. We might not be able to do this in a day, but it must be done shortly, and it was to our interest to turn our attention to all sources from which a supply of cotton could be obtained, especially to Africa, as being a large natural cotton field. Therefore he said—Encourage this emigration, and plant industrial settlements wherever it was possible, and endeavour to find other districts along the coast which should resemble Liberia in the natural growth of the soil, and in the industrial activity of the inhabitants. He would only further say he had never presided over a meeting with more gratification than he had done that evening, in which they had gained so much information upon Africa, and in which they had had not only specimens of the produce of the country, but also specimens of the men of Africa who were capable of growing it, and who had shown them, by the intelligence and education they had exhibited, to what a degree of perfection, and how much higher in the social scale they would attain if they were afforded the opportunity. In conclusion, he begged to propose that the thanks of the meeting be given to Mr. Gerald Ralston for his very able paper.

The vote of thanks being passed,

MR. GERALD RALSTON expressed his acknowledgments to the meeting for the very patient attention with which they had listened to his paper. He could assure them that, as the representative of Liberia, he felt under the deepest obligation to them for the kindness and courtesy they had shown to the President, the Ex-President, and other officials connected with that colony, in their visit that evening.

The paper was illustrated by a collection of the products of Liberia as sent to the International Exhibition. These consisted of specimens of cotton cloth, well manufactured and dyed; of coffee, sugar, raw cotton, palm oil, oil from the kernel of the palm-nut, rice, silk worm cocoons.

Swords made by the natives from the iron of the country, with stone anvils and hammers, pouches, leather accoutrements for horses, and a great variety of fibres were also on the table.

The Secretary announced that there would be no meeting next Wednesday evening, but that the next meeting would take place on Thursday, the 29th instant, when a Paper by Mr. William Hawes, "On the International Exhibition of 1862," would be read. On this evening the Right Hon. the Earl Granville, K.G., will preside.

THE ASSOCIATION FOR THE PREVENTION OF STEAM-BOILER EXPLOSIONS, MANCHESTER.

At the last ordinary monthly meeting of the Executive Committee of this Association, held at the offices, 41, Corporation-street, Manchester, on Tuesday, April 29th, 1862, Hugh Mason, Esq., Ashton-under-Lyne, Vice President, in the chair, Mr. L. E. Fletcher, chief engineer, presented his Monthly Report, of which the following is an abstract:—

"During the last month there have been examined 363 engines and 563 boilers. Of the latter, 10 have been examined specially, 8 internally, 87 thoroughly, and 458 externally; in which the following defects have been found:—Fracture, 14 (3 dangerous); corrosion, 47 (5 dangerous); safety-valves out of order, 18 (1 dangerous); water gauges, ditto, 8; pressure gauges, ditto, 8; blow-off cocks, ditto, 33; fusible plugs, ditto, 4; furnaces out of shape, 6 (3 dangerous):—Total, 138 (12 dangerous): Boilers without glass-water gauges, 5; without pressure gauges, 22; without blow-off cocks, 15; without back pressure valves, 42.

"I am happy to be able again to report that no explosion has occurred during the last month to any boiler under the inspection of this Association. Four explosions, however, which have happened in other quarters, have come to my knowledge, from three of which loss of life has resulted; one being of the most disastrously fatal character, no less than twenty-seven persons being killed.

"The latter of these explosions occurred at an iron works to a vertical boiler, heated by the flames from four iron furnaces. These flames first played upon the lower part of the outside of the boiler, and then passed through four openings in the side into an internal descending flue in the centre, and thence to the chimney. The boiler was cylindrical and egg-ended, and precisely similar in general arrangement to that first described in last month's report, being technically termed an upright furnace boiler. Its height had been about twenty-seven feet, and its diameter ten feet, while the thickness of the plates had varied in the original construction from five-sixteenths to seven-sixteenths. Its age was about nine years, and its working pressure, although stated by the engine attendant to have been 35 lbs., was concluded from an examination of the safety valves, &c., on an official inquiry at the instance of the coroner, to have been not less than 50 lbs.

"The injury done, however, in the present instance, was much greater than that resulting from the explosion of the boiler referred to in the last report. In that case, the crown of the internal descending flue was blown down, when the boiler shot upwards like a rocket, from unbalanced pressure. In the present case, the external shell in the lower part had rent, and an entire circumferential strip or belt ripped off, and scattered in several fragments. The main portion of the boiler, including the internal flue, had flown to a considerable height, being carried, as in the previous case, in the direction of the wind, falling completely beyond the boundary of the works, clearing the Great Western Railway, as well as a tramway, in its flight, and bedding itself so deeply in the ground as

to exclude access through the rent at the bottom; the shell, as well as the internal flue, being considerably distorted by the shock on coming to the ground. The fragments rent from the lower part of the shell had been blown laterally, sweeping down several of the columns of the building on which the roof depended for support, so that the whole became one general ruin. The brick-work flue surrounding the boiler, and which stood about fifteen feet above the ground, was scattered in every direction, just as the particles of a bomb-shell, and had riddled the roofs and windows of all the surrounding buildings. The percussive force of the steam had also destroyed the adjacent iron furnaces, and unseated, as well as denuded of its surrounding brick flue, a twin-vertical boiler, which had previously worked in conjunction with the one in question, being connected to it by a common steam-pipe. I note these facts, since, although unimportant in themselves, they show the destructive nature of the percussive action of steam, which should be taken into account in addition to the force of disruption and effect of unbalanced pressure, when attempting to unravel the complicated effects of explosions.

"There are grave objections to the construction of this boiler, as well as to the mode in which it was set. The intense flames from the furnace by which it was heated, impinged most severely upon the lower part of the external shell, the diameter of which, being not less than ten feet, was of unusual size, while, in addition, the water was sedimentary. The combination of a high tensile strain upon the plate, which a large diameter—such as that in the present instance—involves, with an intense flame locally applied, added to an accumulation of deposit, is always dangerous on account of liability to injury from overheating of the plates, and more especially of the seams of rivets; and it will be remembered that several explosions from this cause have lately been called attention to in these reports. Added to this, from the fact of the flame operating upon the bottom of a water-space, the circulation of the water was necessarily incomplete; and thus the risk was increased by the rapid generation of the steam driving the water away from the plates. Many instances have occurred of plates being seriously overheated from this cause, even when the boiler contained a plentiful supply of water.

"It may be added that the boiler had been found so leaky a few weeks before the explosion, that a dose of brian had been resorted to, in order to stop it. Brian, while it stops the leaks, thickens the water, and prevents the globules of steam escaping freely, and thus would be most dangerous in a boiler already predisposed, as this one was by its construction and local impingement of the flame, to have the water driven away from the plates.

"Examination of the fragments, as well as of the seams of rivets in the twin boiler, confirmed the opinion that the plates had been weakened by overheating, and I consider the dangerous construction and setting of the boiler quite sufficient to account for the explosion. An accidental circumstance, such as a temporary increase of pressure, may have been the actual exciting cause in ultimately inducing explosion, but the conditions under which this boiler was working were such as, I am persuaded, no boiler can safely endure for any length of time, and since these conditions are not by any means confined to boilers of similar construction, their consideration will be worth the attention of our members generally.

"After the two most serious explosions that have lately occurred, within a few weeks of one another, in the iron districts, to boilers of this description, and each attended with such fatal consequences, it will certainly be most reprehensible if another day is allowed to pass without having all similar boilers carefully examined, and their safety ascertained.

"Another life has been lost during the past month through the rupture of a Cornish boiler, which did not, however, result in explosion. The flat-end plate had been allowed to groove at the furnace crown without repair,

until it at last penetrated the entire thickness of the plate, when a rupture occurred, from which scalding, terminating fatally, ensued. The boiler, however, is reported not to have moved from its seat, which I have found to be the case under similar circumstances.

"The great difference between the result of a rent in a flat plate as above, and when occurring in a cylindrical shell, as in the previous instance, will be at once seen. I have always found that those explosions which have resulted in the most serious consequences have been caused by rupture of the cylindrical portion of the shell, and hence its condition is a matter of the greatest importance; and it appears to me, therefore, desirable that it should be exempted from the injudicious action of the fire to which boilers externally fired are exposed."

GALVANIZED IRON FOR ARMOUR-PLATED SHIPS.

The following is an abstract of a paper read by Dr. Crace Calvert, F.R.S., before the Literary and Philosophical Society of Manchester:—

The author stated that no doubt many gentlemen present were acquainted with the fact that he had been for some time past engaged in ascertaining the chemical composition of various woods employed and susceptible of being employed in the navy. On a recent visit to one of the dockyards he found that while the armour-plates were fixed against a layer of teak, the ribs of the ship were of oak, and that the iron bolts which were to fasten the plates were to pass through the oak ribs. It occurred to him that the inconvenience which would probably result from the action of the oak upon the iron might be obviated by substituting galvanised iron bolts for those now in use, and he therefore instituted a series of experiments, the results of which he had great pleasure in laying before the meeting.

The first series of experiments consisted in driving through large pieces of oak, bolts and screws of unprepared iron, and of galvanized iron prepared by his friends, Messrs. Richard Johnson and Brother, of Dale-street, Manchester, which were then immersed in soft and sea water for the last three months. The results clearly showed, firstly, that the friction did not remove the zinc from the galvanized iron; secondly, that the oak and galvanized bolts were unchanged; whilst the unprepared iron bolts were much rusted, and the pieces of oak had become quite black by the formation of tannate and gallate of peroxide of iron. During the experiments the waters were changed every week, those containing the galvanized iron appearing unaltered, whilst in the case of the unprepared iron, they had a dark blue-black appearance, owing to the formation of gallate and tannate of iron.

In order to ascertain the comparative action of soft and salt water upon iron and galvanized iron when in contact with oak under identical circumstances, he made the following series of experiments.

Plates of galvanized iron, having 18 inches of surface, lost during the three months the following weights:—

	SOFT WATER.	SEA WATER.
Plate No. 1.....	0.10 grains	—
" No. 2.....	0.11 "	—
" No. 3.....	—	0.095 grains.
" No. 4.....	—	0.090 "

Similar plates of iron lost during the same time:—

	SOFT WATER.	SEA WATER.
Plate No. 1.....	1.23 grains.	—
" No. 2.....	1.52 "	—
" No. 3.....	—	2.40 grains.
" No. 4.....	—	2.38 "

There can therefore be no doubt that galvanized iron offers great advantages, the action of water on it being less than a tenth of the same action on unprepared iron.

and further, as iron when galvanized is in the most favourable electrical condition to resist the action of oxygen, being in an electro-negative condition, it follows that in all probability the use of galvanized iron would be very advantageous in armour-plated and other iron ships. The author hoped that Government and other large ship-builders would avail themselves of this suggestion, and make experiments on a large scale to verify the results he had obtained.

Home Correspondence.

MACHINE FOR CUTTING OVALS.

SIR—By the description of an invention for this purpose, inserted in your *Journal*, page 399, it would appear that Mr. Robert McAllister, of Dublin, is not exactly aware of the great difference between the oval, or egg-shape, and the true elliptical curves belonging to the conic sections.

Mr. McAllister's machine, which may be found in most old works, especially with a figure in the "Cyclopædia" edited by the late Dr. Rees, will only describe the oval, or egg-shape, that is to say, a curve with dissimilar ends, and cannot by any contrivance be made to produce the ellipse as formed by the section of a cone by an oblique plane, which is perfectly symmetrical at both ends.

By means of various additions and contrivances the oval machine may be made to perform innumerable curves by continual motion, of very great variety, but all compounded of the original egg-form, which is displayed more or less in all, and some time since I had the pleasure of showing you a large variety of patterns drawn by means of such a machine. One, not the least striking, is the outline of the horseshoe, formed by reversing the small end of the oval and placing it within the larger; an operation which the machine performs spontaneously, by merely causing an entire revolution of the pencil or tracer.

Mr. McAllister's arrangement, however, is very convenient, as he has placed the guides for the sliding centre on the outside edges of the drawing board instead of upon it.

I remain, &c.,

HENRY W. REVELEY.

SIR—The machine for cutting ovals or "concentric ellipses," described in the Society's *Journal* of the 2nd May, is not adapted for the purpose intended, inasmuch as it will not cut ellipses, but simply egg-shaped ovals. The error, though slight, is very appreciable to the eye, and can be proved analytically and geometrically. I will not trouble you with the former proof, but give the latter as concisely as possible.

First, let me point out an error in the diagram given. As the centre point of DD is represented as the centre of the major axis of the ellipse, let this point be O; then OA the distance of centres = BD; but this is impossible if AB is parallel to OD, and both are at right angles to CA. The line OD then should therefore make an angle with OA less than a right angle.

Now, as the ordinate of the ellipse bears to a similarly situated ordinate of the circle (whose diameter equals the major axis), a constant ratio, viz., $\frac{\text{minor axis}}{\text{major axis}}$, so vice versa it is necessary for this constant ratio to hold that the ordinates should be similarly situated. Therefore, if the ellipse is to be traced by a continuous motion, that motion must be the same for both curves measured in the direction perpendicular to the ordinates, that is, parallel to the major axis in this case.

But the motion of every part of the rod or right line, CDB is varying slightly, since the angle BCA is con-

stantly altering in magnitude as B traces the circle; and B and D are in this line.

And this can be rendered very apparent by drawing a segment of a circle through B with a centre C cutting the line CA; it will be seen that C moves in the direction of the line CA more or less in comparison with B, according as B is nearer or further off from C than the perpendicular through the centre.

I believe it will be at once seen that the machine fails here. If any one has further doubts, it is very easy to make a curve on the proposed method, and then fold it across the so called minor axis, when the error will be at once perceived.

I have no doubt most of your readers will have noticed at once the fallacy, but as some may not have done so, I trouble you with these few remarks.

I am, &c.,

W. WEST.

5, St. Paul's-villas, Camden-square, 7th May, 1862.

SIR,—Mr. McAllister is in error in supposing that his machine is capable of describing an ellipse. What it does effect is an oval curve, of the eighth degree, which differs from the ellipse in this important respect (taking Mr. McAllister's own figure), that it cannot be divided into two similar halves by DD, or by any line parallel to it. In fact, it appears clearly, both from the geometrical construction and from the algebraic equation of the curve, that neither DD nor the maximum ordinate divide the major axis equally. The true maximum is not DD, as drawn in the figure, but corresponds to a position of the line AB, intermediate between B and the point at which BC touches the circle.

I have no reason to doubt Mr. McAllister's statement that, as a draughtsman, he finds the instrument of great value. But it does not make true ellipses.

There is no practical difficulty in describing perfect ellipses by continued motion. Approximate methods are more numerous than useful.

I am, &c.,

C. W. M.

SIR,—In your number for May, I see a description of a machine for cutting ovals: as we have had machines for this description of work in use for some time at our establishment, will you kindly allow me to describe the kind of work our machines can do.

The first attempt was some years ago, when being asked by a large firm in the Birmingham trade to make them a machine for turning ovals and fancy work (in wood and iron), we supplied a tool for the purpose, which is still in use. Since then, the machine has been greatly improved, so that we can now turn a square shaft and the coupling to fit it. The same machine will produce ovals of any size, and curves of all descriptions (no templates being required). As a proof of its efficiency we can show spur wheels (working admirably), all the teeth of which have been most accurately and beautifully cut whilst revolving. We have also a small machine on the same principle, which we use for turning hammer-shafts, giving them the peculiar curve required to suit the hand, no template being used.

These machines work wood or iron, chiefly the latter.

I am, &c.,

ROBERT BEACOCK.

Round Foundry, Leeds, May 6th, 1862.

THE PATENT LAW.

SIR,—Mr. Reveley's letter, which appeared in the Society's *Journal* of the 9th instant, in which he gives a statement of the reasons why he supposes the (as it seems to me) unlimited robbery of inventors should be legalised by the abolition of the Patent Laws, should not, I think, be allowed to pass current through the agency of the Society for the Encouragement of Arts, Manufactures, and Commerce, without, at least, a word in reply, and, there-

fore, perhaps you will permit me to say a word on the subject.

Mr. Reveley seems to take it for granted that the professed and only argument in favour of the Patent Laws is, that they cause many men to invent. Now, although I believe these laws to be a great incentive to mental effort in forwarding industrial improvement, yet I believe that this is not the stronghold of their soundness as good public policy, for it may be that talented and ingenious men would produce, and even in a certain way publish, new inventions if these laws ceased to exist, but such publication would, I am well assured, amount only to suggestion or mere laboratory experiment in nine cases out of ten, and then the practical result would be, that the industrial arts would not be advanced a single step thereby; indeed, his own case of anticipating the Armstrong gun is an illustration of this; he not having, by his unconditional communication of his intention to the Government, obtained any profit or interest in the success of his suggestion or invention, had no inducement to practically develop his invention, and certainly none to impel him to go on and encounter the badgering which anyone must per force encounter who seeks to obtain the adoption of novelties by Governmental Boards, and, moreover, he acquired no status such as would enable him to interest capitalists or others in lending their aid in the matter; hence he let his invention rest where he first placed it, and the Government forgot its existence till Sir W. Armstrong found out the same thing, and made it available for the benefit of himself and of the nation. As to the suggestion that capitalists associated with inventors play them false, I think, from what I have seen of these matters, that where this does occur (and although I do not think it occurs so often as many people suppose, yet I admit it happens too frequently), the capitalist has much to offer in extenuation of his conduct, and mostly the difficulties arising have been caused by matters not within the scope of the Patent Laws.

As to the Patent Laws being a product of the semi-barbarous age of Queen Elizabeth, I might say that if this is to be an argument against them it will be one quite as powerful against Magna Charta, the rights of the possessors of landed property, Trial by Jury, and many other things which date from times still further back and yet more barbarous.

I am, &c.,

F. W. CAMPIN.

London, May 17, 1862.

RECREATION AT MECHANICS' INSTITUTES.

SIR,—It was remarked by a writer in *Blackwood's Magazine*, on "The Stage of Weimar," that the managers of our Mechanics' Institutes had too much neglected the important question of providing healthy and rational recreation for our working population. The subject was brought before the annual meeting of the Yorkshire Union, held at Batley last month, and though much difference of opinion was expressed, the difference arose chiefly from the varied experience of the delegates, the importance of the question in its practical application depending very materially upon the nature of the employment, the habits, and associations of the people. In towns like Huddersfield, Bradford, Halifax, and similar places, where the labour is comparatively light, the occupation of the day may be, and is to a great extent, followed by the mental cultivation promoted by the evening classes of the Institute. But in other places, where the employment of the people is chiefly in iron and steel works, glass works, potteries, collieries, and similar kinds of exhaustive labour, there is a natural and almost irresistible inclination to resort to a more direct and appreciable relaxation, however injurious may be the ultimate results. It is in such cases that the managers of Mechanics' Institutes may do much good by a judicious system of recreation, even though it may not be of a very intellectual character, which may prove as really attractive as the public-house, and at the same time less expensive. The improvement

effected may not be all that the friends of popular education may desire, but it will be a considerable advance upon the amusements too often resorted to, and if carried on with judgment and perseverance, may induce very many to see the advantages of self-improvement, and the benefits to be derived from the educational departments of the Institute.

In too many Institutes the attention of the Managing Committee has been confined to the stereotyped features of classes, library, reading-room, and lectures, as though by no other means the working people could be reached for their good. Many, however, have acquired too little of the rudiments of learning at the day-school to enable them to appreciate any of the advantages offered; they cannot read with sufficient ease for reading to be a pleasure; in vain are they offered the certificates of the Society of Arts, for they are hopeless of attainment, and the natural consequence is, that as all which the Institute can do for them is out of their line, they resort to the public-house, where they can get warmth, light, and social converse. The Institute might afford all this at less cost to the purse and health, and music might be made a powerful attraction, judiciously varied with occasional readings.

In several places the attractive element has been tried with a very fair amount of success. At Worcester, the Working Men's Institute has a class concert every Saturday night, and a dance on Mondays for the wives and families of the members. At Derby, a cheap Saturday night concert has been very largely attended. At Leeds, a Working Men's Institute numbers about 800 members, attracted by a popular lecture once a week, and on other evenings by chess, draughts, and conversation. At Sheffield, a Saturday night concert, in which the amusement has been chiefly vocal music, accompanied by a pianoforte, has been numerously attended; and at some smaller places the practice of reading aloud to the members has been very attractive. In all these cases some good has been done, by weaning our working population from debasing pursuits, and though the amount of mental cultivation may have been comparatively small, it has been a step in the right direction, giving promise of better things for the future. If the people have not been much instructed, they have in some measure been brought within the influence of the Institute, and an opportunity thereby afforded for appealing to their good sense as to the things which concern themselves.

The question is not without considerable interest, and, as much of the value will depend upon its application to the particular circumstances of various localities, it would perhaps be advisable that some of your correspondents who have had experience on the matter would give the benefit of it to others, so that something like a right conclusion may be arrived at as to what to do and what to avoid. The Committee of the Leeds Mechanics' Institution has agreed to offer a prize for the best essay on the subject, to be competed for by members of the Institutes in the Yorkshire Union. A similar plan might be followed in some other places with advantage.

I am, &c., BARNETT BLAKE.
Leeds, May, 1862.

MEETINGS FOR THE ENSUING WEEK.

MON.....R. Geographical, 1 P.M. The Royal Awards for the "Encouragement of geographical science and discovery," will be presented by the President, Lord Ashburton, at Burlington House. The Duke of Newcastle will receive the Founder's Gold Medal, on behalf of the late Richard O'Hara Burke, for his expedition across Australia, and also a Gold Watch for Mr. John King, the only survivor of Burke's Expedition. Captain Thomas Blakiston, R.A., will then receive the Patron's Gold Medal for his Survey of the Yang-tze-Kiang. The President will then deliver his Annual Address on the Progress of Geography. The Chair at the Dinner at Willis's Rooms will be taken by the President-Elect, Sir Roderick I. Murchison, at 7 P.M. precisely.

TUES.Medical and Chirurgical, 8½.
Civil Engineers, 9. President's Conversazione.
Zoological, 9.
Royal Inst., 4. Rev. G. Butler, "On the Art of the last Century."
WED.Archæological Assoc., 8½.
R. Horticultural, 2.
THURS.Society of Arts, 8. Mr. Wm. Hawes, "On the International Exhibition of 1862."
Antiquaries, 8½.
Royal Inst., 3. Dr. Lyon Playfair, "On the Progress of Chemical Arts (1851-1862)."
FRI.Royal United Service Inst., 3. Colonel R. A. Shafter Adair, "The Lines of London; Defence by Works and Manœuvre in the Field." Illustrated by a model, as shown in the International Exhibition.
Royal Inst., 8. Mr. Thomas Bazley, M.P., "A Plea for Cotton and for Industry."
SAT.Royal Inst., 3. Prof. Anderson, M.D., "On Agricultural Chemistry."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, May 16th, 1862.]

Dated 7th January, 1862.

46. J. Tatham, Rochdale—Imp. in machinery or apparatus for preparing, spinning, doubling, and winding cotton and other fibrous materials.

Dated 8th January, 1862.

50. L. Wunder, Liegnitz, Prussia—Imp. in the manufacture and composition of soap, applicable especially for shaving.

Dated 16th January, 1862.

139. T. Roberts and J. Dale, Manchester—Imp. in the manufacture of gunpowder.

Dated 28th January, 1862.

219. M. A. F. Mennons, 39, Rue de l'Échiquier, Paris—Imp. in the construction of looms for weaving. (A com.)

Dated 8th February, 1862.

335. F. Tolhausen, 35, Boulevard Bonne Nouvelle, Paris—Imp. in the manufacture of tyres of railway wheels, and in apparatus for such purpose. (A com.)

Dated 12th February, 1862.

365. F. Tolhausen, 17, Rue du Faubourg Montmartre, Paris—Imp. in the construction of vertical steam boilers. (A com.)

Dated 18th February, 1862.

426. H. E. Quant and G. H. Fisk, 1, High-street, Manchester, and W. Dawes, Bolton—Imp. in the method of, and apparatus for, securing the ends of steel or other materials used for crinolines.

Dated 1st April, 1862.

909. W. Clark, 53, Chancery-lane—Imp. in kneading machines. (A com.)

Dated 4th April, 1862.

971. M. Walker, St. Benet's-place, Gracechurch-street—Imp. in breech-loading rifles, and other fire-arms, and in ordnance.

Dated 10th April, 1862.

1026. J. Lillywhite, Seymour-street, Euston-square, and T. Nixon, Chelford, Chester—An improved bowling apparatus for cricket balls.

Dated 21st April, 1862.

1157. A. Marks, Cannon-street-road—Imp. in artificial feathers, applicable to certain ornaments of dress.

Dated 22nd April, 1862.

1166. T. Lea and S. Smith, Smethwick, Staffordshire—Imp. in burglary alarms or indicators.

Dated 23rd April, 1862.

1175. R. Jinks, 20, Upper King-street, Bloomsbury—Imp. in apparatus for suspending, raising, and lowering Venetian blinds, and for retaining them and other blinds, and also curtains and sun shades, at any required height.

1177. W. Moir, Manchester—An improved instrument for ascertaining the specific gravity of liquids.

1178. G. N. Bates, New Basford, Nottingham—Imp. in dressing lace and other fabrics.

1179. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in lubricating apparatus. (A com.)

1181. J. Price, Dundalk, Ireland—Imp. in spikes for railways and other purposes, and in the mode of manufacturing and securing the same.

1183. W. Fear, jun., Bristol—Improved arrangements for joining the saw plates of veneer and other saws constructed in segments.

1185. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for taking deep sea soundings, and for recording the speed of ships. (A com.)

1189. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of imitation lace, net, or openwork fabrics. (A com.)

Dated 24th April, 1862.

1191. J. Endean, Locks-fields, Waltham—Imp. in cocks, taps, and valves.
1192. W. Haggett, Sherborne, Dorsetshire—Imp. in locomotive engines and carriages for railways, part of which improvements are applicable to carriages and vehicles for tram and common roads.
1193. H. Wheatley, Hopton Mills, Mirfield—Imp. in or applicable to the employment of steam for heating or drying purposes.
1195. W. D. Ruck, 8, Duke-street, London-bridge—The manufacture of grease from coal, tar, coal oil, creosote, or dead oil.
1197. G. Davies, Bellevue-terrace, Seven Sister's-road, Holloway—Imp. in the manufacture of matting, and in apparatus for the same.
1199. J. F. Allen, New York—Imp. in slide valves and valve gear for steam engines.
1201. F. Dangerfield, Bedford-street, Westminster—Imp. in lithographic or zincographic presses.
1203. J. Offord, Wells-street, Oxford-street—Imp. in carriages.

Dated 25th April, 1862.

1207. F. Barnett, 164, Rue de Rivoli, Paris—Improved electric danger signals for railways and other cognate purposes.
1208. G. Richards, 2, Caroline-street, Bedford-square—Imp. in ordnance, and the manner of loading such with the charges and projectiles suitable thereto.
1213. R. P. Roberts, 3, Exeter-villas, Kennington Oval—Imp. in the preparation of paper for copying letters and other documents, and in the preparation of copying ink.
1215. J. Shaw, Liverpool—Imp. in steam and other power engines and indicators. (A com.)
1217. C. Reed, Kintbury, Berkshire—A new method of treating the sorghum saccharatum or holcus saccharatus in order to obtain saccharine liquor and pulp therefrom.
1219. A. Applegarth, Dartford—Imp. in printing in colours, and in apparatus to be employed for this purpose.
1221. W. Fiske, Stamfordham, Northumberland—Improved apparatus for cultivating land by means of steam power.

Dated 26th April, 1862.

1225. D. C. Le Souef, Twickenham—An imp. in the manufacture of nails, bolts, rivets, screws, eyes, and split keys or pins. (A com.)
1227. G. H. Law, 17, Rochester-road, Camden New Town—Improved means for draining flower pots, and other articles or things which require draining in the same or a similar manner.
1229. E. Alean, Coleman-street-buildings—An imp. in, or addition to, carding engines. (A com.)
1230. W. Clark, 53, Chancery-lane—Imp. in collars, wristbands, and cuffs. (A com.)
1231. S. Cheavin and G. Cheavin, jun., Boston—Imp. in filtering and purifying water, and in apparatus employed therein.
1233. A. Boyle and T. Warwick, Birmingham—New or improved machinery for manufacturing hair pins and cottar pins, a part of which machinery may also be used for cutting off and pointing wires for various purposes.
1235. G. Bischof, jun., Swansea—Imp. in treating solutions containing copper and silver, or either of them, to obtain metallic copper and silver.
1237. A. Lester, Coventry—Imp. in the manufacture of the fronts or uppers of slippers, shoes, boots, and gaiters, and of mats, bags, fire screens, and various other articles which are usually made of ornamental or Berlin needlework.
1239. A. V. Newton, 66, Chancery-lane—Imp. in lamps for burning coal oil and other hydro-carbons. (A com.)

Dated 28th April, 1862.

1240. G. B. Goodman, 29, Baker-street, Portman-square—Imp. in machinery or apparatus for preventing accidents in or at mine shafts.
1241. J. Burnie, Castle Douglas, N.B.—Imp. in tobacco pipes.
1243. R. Vaile, Auckland, New Zealand—Imp. in propellers for ships and boats.

Dated 29th April, 1862.

1245. G. R. Semson, 8, Old Chapel-row, Kentish-town—Imp. in valves or cylinders for wind musical instruments.
1246. H. F. Wells, Woodland-house, Prospect-row, Woolwich—Imp. in screw clamps or cramps for joiners' and other work.
1248. J. E. A. Gwynne, Essex-street-wharves, Strand—Imp. in the construction of centrifugal pumps, and in the application thereof, parts of which imp. are also applicable to other pumps.
1253. J. Ross, 53, Chancery-lane—Imp. in grinding stones or surfaces for grinding grain and other substances. (A com.)
1255. J. Cliff, Lambeth—Imp. in insulators for supporting telegraph wires.
1261. W. E. Newton, 66, Chancery-lane—Imp. in machinery for picking, burring, and cleaning wool and other fibrous substances. (A com.)

Dated 30th April, 1862.

1270. A. T. Mercier, Louviers, France—Imp. in weaving looms.
1274. H. Hickman, 2, Miller-place, Park-road, Dalston—An imp. in the method of fastening ladies' crinoline skirts and other articles of wearing apparel, and elastic and other bands.

Dated 1st May, 1862.

1290. T. Holmes, 15, Princes-terrace, St. Mark's, Regent's-park—Imp. in the manufacture of military cartridges, portemonnaies, courier bags, letter bags, knapsacks, and other articles of a like nature.

Dated 2nd May, 1862.

1291. T. F. Griffiths, Birmingham—An imp. or imps. in raising or shaping sheet iron.
1296. O. C. Evans, 20, Church-street, Old Kent road—A reversible attachment to a shaft or arbor for converting reciprocating rectilinear into rotary motion.
1298. C. Ashwell, Albany-road, Barnsbury-park, Islington—An improved safety fastening applicable to the locks of doors.
1302. J. W. Gill, Woolfardisworthy, Crediton, Devonshire—Improved apparatus for turning up and pulverising the soil of land for cultivation.
1304. A. V. Newton, 66, Chancery-lane—Improved electrical apparatus, applicable to the lighting of gas. (A com.)

Dated 3rd May, 1862.

1306. J. Brierley, Blackburn—Imp. in the construction of fire-plugs, or valves to be used in extinguishing fires, or for other purposes where water in required to be drawn from mains under pressure.
1310. H. G. Moffatt, Dalston—An improved advertising medium.
1312. T. Snowden, Stockton-on-Tees—Imp. in the manufacture of steel tyres, hoops, and cylinders, and in furnaces employed therein, and applicable to the melting of steel generally. (A com.)
1314. J. Herdman, Belfast—Imp. in the manufacture of wrought iron, steel, or combined wrought iron and steel plates, adapted for ship building and other purposes for which strength and lightness are required.
1318. J. Fowler, Leeds—Imp. in engines for hauling agricultural implements.
1320. W. E. Newton, 66, Chancery-lane—An improved method of joining boxes. (A com.)
1322. C. Schlickeysen, Berlin—Imp. in machinery for moulding bricks, tiles, pipes, and turf.
1324. P. V. Lefebvre, 29, Boulevard St. Martin, Paris—Imp. in fountain pens.

Dated 5th May, 1862.

1326. T. Parkinson, J. Norton, jun., and R. Cottam, Blackburn—Certain imp. in the construction of furnaces for steam boilers.
1330. S. Barnett, 23, Forston-street, Hoxton—Imp. in helmets for divers.
1332. C. Binks, Parliament-street, Westminster—Improved methods of obtaining hydrogen gas and certain gaseous compounds of hydrogen and of carbon.

PATENTS SEALED.

[From Gazette, May 16th, 1862.]

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|-----------------------------------|-------------------------------|
| 2908. R. A. Brooman. | 2964. P. Cowan. |
| 2909. J. Schloss. | 2980. F. A. Calvert. |
| 2915. J. C. Croxford. | 2994. M. Henry. |
| 2916. W. P. Bayliss. | 3037. T. Stead and W. Higham. |
| 2919. E. Peyton and W. F. Batho. | 3079. M. A. F. Mennons. |
| 2923. J. H. Jeffs. | 3080. M. A. F. Mennons. |
| 2924. G. H. Polyblank. | 3112. M. A. F. Mennons. |
| 2933. R. De Clerq & E. Chazelles. | 3135. A. V. Newton. |
| 2938. E. Peyton and W. F. Batho. | 395. W. G. Valentin. |
| 2940. M. Henry. | 685. G. Ermen. |
| | 727. W. Clark. |

[From Gazette, May 20th, 1862.]

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| 2944. J. Weems. | 2977. G. E. Donisthorpe, W |
| 2948. W. Bray. | Firth, and R. Ridley. |
| 2950. F. De Wyld. | 2979. J. Standfield. |
| 2952. J. B. Hulard and L. G. Poupel. | 3000. J. M. Rowan. |
| 2955. J. Ronald. | 3006. B. Pitt and J. J. Shedlok. |
| 2957. W. Burgess. | 3181. T. Bourne. |
| 2960. J. H. Johnson. | 151. J. A. Knight. |
| 2963. G. Clark. | 240. W. E. Newton. |
| 2970. W. Sellers. | 668. W. H. Latham and F. C. W. Latham. |
| 2975. W. Firth and R. Ridley. | 722. J. Avery. |
| | 832. J. Wilson. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, May 20th, 1862.]

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| 1200. R. Gourlay. | 1258. T. S. Cressy. |
| 1201. T. Vicars, sen., T. Vickers, jun., T. Ashmore, and J. Smith. | 1318. T. Wilson. |
| 1024. W. S. Thomson. | 1219. G. Allcraft. |
| 1213. J. Chatterton. | 1214. S. C. Sheard. |
| 1250. J. P. Budd. | 1231. E. Charlesworth. |
| | 1242. R. Wilson. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, May 20th, 1862.]

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| 1099. G. T. Bousfield. | 1134. T. Piggott. |
| 1133. F. W. Mowbray. | 1157. J. J. Meyer. |
| 1153. G. Collier. | 1127. W. H. Tucker. |

Journal of the Society of Arts.

FRIDAY, MAY 30, 1862.

CONVERSAZIONI.

The second and third Conversazioni of the present season will be held at the South Kensington Museum, on the 9th of July and the 8th of October.

INTERNATIONAL EXHIBITION OF 1862.

SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £451,800, have been attached to the Deed.

TWENTY-SECOND ORDINARY MEETING.

THURSDAY, MAY 29TH, 1862.

The Twenty-second Ordinary Meeting of the One Hundred and Eighth Session was held on Thursday, the 29th inst., the Right Hon. the Earl Granville, K.G., Vice-President of the Society, in the chair.

The following candidates were proposed for election as members of the Society:—

Churchill, Lord Alfred S., M.P.	16, Rutland-gate, S.W., and Athenæum, S.W.
Kennedy, John	Whitehaven.
McConnel, James	Bent-hill, Prestwich, near Manchester.
Robinson, Francis	48, Conduit-street, Hanover- square, W.
Scott, James	St. John's Grammar School, Hamilton, N.B.
Scovell, George	34, Grosvenor-place, W.
Sutton, Edwin	204, Regent-street, W.

The following candidates were balloted for and duly elected members of the Society:—

Chapman, David Ward...	Totness-park, Sunningdale, Berks.
Clabon, John Moxon.....	21, Great George-street, S.W.
Cowper, Samuel T.....	Leeds Iron Works.
De Vandoni, Gen. Count.	45, Manchester-street, Man- chester-square, W.
Dobson, J. T.....	Hull.
Fleming, George	22, St. James's-street, S.W.
Fox, Thomas	Lordship-lane, Tottenham, N., and 93, Bishopsgate-st., E.C.
Gardener, Chas. Henry...	West Harding-street, Fetter- lane, E.C.
Hall, Collinson	Navestock Hall, Essex.
Hall, Ralph	Manchester.
Hannay, John	Springfield, Ulverston.
Knight, J. G.....	47, Pembroke-square, Ken- sington, W.
Low, Sampson, sen.	47, Ludgate-hill, E.C.
Marshall, J., M.D. ...	Queen's-rd., Up. Norwood, S.
Maule, George	1, Kennington-road, S.
Neilson, Walter.....	172, West George-st., Glasgow.
Overend, James.....	47, Parliament-street, S.W.
Pearson, Z. C.....	34, Great St. Helen's, E.C., and Hull.
Rodoconachi, M. E.	3, Gloucester-square, Hyde- park, W.
Ryley, Edward Chas. ...	16, Gt. Prescott-street, Good- man's-fields, E.
Sharman, Edward Alfred.	2, Heathcote-street, Mecklen- burgh-square, W.C.
Shaw, George.....	9, King Edward-street, E.C.
Siebe, Daniel	17, Mason-street, Lambeth, S.
Spence, Joseph	22, St. James's-street, S.W.
Summerscales, John	Keighley, Yorks.
Taylor, George	Clarence Iron Works, Leeds.
Traer, J. R., F.R.C.S. ...	47, Hans-place, Sloane-street, S.W.
Ward, Reginald.....	20, Albion-road, St. John's- wood, N.W.
Weston, Joseph D.	Stanhope-villa, White Ladies'- road, Clifton, Bristol.
Wickens, H.	112, Camden-rd.-villas, N.W., & 4, Tokenhouse-yard, E.C.
Young, William Joseph..	Roker, Sunderland.

AND AS HONORARY CORRESPONDING MEMBER.

Kaznadar, The General	First Minister and Minister for Foreign Affairs to the
Mustapha	Bey of Tunis.

The Paper read was—

ON THE INTERNATIONAL EXHIBITION OF 1862.

By WILLIAM HAWES.

It is just twelve months since I had the honour, at the request of my colleagues, of reading a paper upon the then contemplated Exhibition, the object of which was to show that there were good grounds for anticipating that an International Exhibition in 1862 would be as interesting, as instructive, and as beneficial to the country as that of 1851. I arrived at this conclusion from the evidence I collected of the progress which had been made since 1851 in every department of science, art, and manufactures, and from the support and encouragement the intended Exhibition would receive from the lively interest it was well known Her Majesty and the Prince Consort took in everything which could aid in its complete development.

In every respect but one these expectations have been fulfilled; manufacturers, at home and abroad, have fully realized—indeed, exceeded—all that could have been expected; and the exhibition, as a whole, far surpasses that of 1851. But in one sad respect—one over which human forethought and care could have no influence—they have been most lamentably disappointed. The Prince to whom

the nation owes so much, to whom this Society is indebted for the proud position it holds, and to whose sagacity and wise appreciation of the wants of his adopted country we owe the conception of the means to carry out successfully an idea which originated abroad, but which this country, under his direction, realized and perfected—is no longer among us. Our Society, in all its proceedings relating to the Exhibition, was specially encouraged and directed by his advice and example. In the papers read at our meetings, in those printed for general circulation, in all communications with our members and the public, whilst shewing, by a careful examination of the facts obtained from all sorts of exhibitions, that there was every reason to feel confident that a properly conducted International Exhibition in 1862 would be a great success, we never failed to express the reliance we placed upon the active support it would receive from the constant supervision of our late Royal President. And although we have every reason to believe that Her Majesty's interest in its success is as intense as ever, it has unfortunately been deprived, by the death of the Prince Consort, of that support, which the constant visits of the Royal family would have afforded; as well as of the intelligent counsel, the sound judgment, the varied and extensive knowledge, and the encouragement of his personal presence, which would have crowned the whole with an *éclat* and national popularity that must have placed this Exhibition in the estimation of the world, as its merits really deserve it should be, far above those which have preceded it. Too much importance cannot be attached to this untimely loss.

I will not, this evening, stop to criticise the building, either architecturally or constructively, nor the arrangements of the Commissioners. The loss they sustained in the death of the Prince Consort, whilst greatly increasing their difficulties, stimulated them, I have no doubt, to greater exertions; and I believe, when all the conditions under which the plan of the building was determined upon are fairly considered, and become generally known, as no doubt they will be when the report of the Commissioners to Her Majesty is published, we shall find that as much has been done, and done well, as could possibly be expected in the management of an undertaking so various, so complicated, and so novel; but whether this be so or not, even if the building be as inartistic as some assert it to be, the faults, as well as the language in which they have been described, will speedily be forgotten, while the great intrinsic merit of the Exhibition—the good feeling it will promote between manufacturers of all nations, must leave an indelible mark in the history of every country participating in it—recording an industrial progress in ten years, greater in some countries than in others, but in all far beyond anything that has ever before been known in a similar or even in a much longer period—thus giving a fresh impetus and renewed vigour to the industry of the world.

But it is said in derision by some that the International Exhibition is but a great shop. A great shop indeed it may be, but if it be a shop it is one to which all the world is proud to contribute its rarest, and its best, as well as its cheapest and most useful works, its highest art, its application of that art and taste to common things, to the luxuries for the rich, and to the necessities for the poor, each improved by extended competition and by the new ideas artists and manufacturers derive from the examination on one spot of articles produced in all parts of the world; thus securing the best and cheapest article for the consumer, showing producer and consumer where they can buy and sell to the greatest advantage, results which could not be attained, beneficial as they are to all, if those who incur the great risk and expense of supplying such various and costly manufactures were prohibited from their sale. Can it, then, be otherwise than an honour to any country to devote itself to the periodical opening of a shop—if it please any one so to call it—or International Exhibition, in which all civilised nations are competitors, by which the people

from all countries are instructed, and feelings of amity and friendship between all nations are cultivated?

I will now proceed to inquire

1st. Whether the International Exhibition of 1862 has realised the expectations of its promoters?

2nd. Are we making the best use of it—nationally, commercially, and socially?

3rd. Is the period of ten years the best for the recurrence of such gatherings?

4th. Do such Exhibitions stimulate the industry of the world, encourage art, and tend to hasten, in the words of our late Royal President, “the accomplishment of that great end to which all history points—the realisation of the unity of mankind—not a unity which breaks down the limits and levels the peculiar characteristics of the different nations of the earth, but rather a level the result and product of these very national varieties and antagonistic qualities?”

If we can answer these inquiries satisfactorily; if we can show that since the first International Exhibition our designs are more simple—our colours purer and our workmanship better; and that the effect of progress is visible in the increase of our trade all over the world, then the object of the Royal Commissioners, of our Society, of the guarantors, and of the exhibitors, has been abundantly realised.

We shall all admit that the most ready mode of estimating the success of public undertakings is to be found by the examination of the opinions expressed upon them in the daily press. We may not agree in the details of its praise or censure, but we must allow that it rarely fails to reflect, with tolerable accuracy, public opinion in its general and most decided outlines. I need not then occupy your time by more than a general reference to the all but unanimous praise by public writers, not in this country only, but in foreign countries, of the magnificence of the articles exhibited, of their superiority over those of 1851 and 1855, and of the absence of inferior commodities, which filled a large space in the Crystal Palace of 1851.

The censure of the press has been confined to criticisms on the building and on the management—the constructive skill and the wonderful rapidity of execution are universally acknowledged. To these censures, without at all admitting their justness, indeed, believing them in the main to be erroneous, we may say that when all circumstances are considered, the immense labour discharged voluntarily by the few upon whom the responsibility of the management has devolved; when prejudice, personal disappointments, and professional jealousies are allowed for; and when we remember the impossibility of the writers of the articles we refer to being fully acquainted with the reasons of the Royal Commissioners for adopting one plan or one course of management in preference to another, it would indeed be wonderful if they were free from as much censure as has been passed upon them. Of this they may, however, be confident, that the country is deeply indebted to them for the energy and skill they have displayed.

All the critics, English and foreign, admit the skilful adaptation of the interior of the building to the purpose for which it has been designed. Many, English and foreign, are loud in their praise of the novel effect produced by the two domes; all acknowledge the admirable construction and perfect lighting of the picture galleries; and all admit that whether tested by the number of exhibitors, English, foreign, and colonial, or by the value and excellence of the articles exhibited, the present Exhibition is vastly in advance of 1851; and I believe I am correct in saying, that not a single critic has ventured to assert that the display, in any important branch of industry, is inferior to that made in the same class in 1851. We will refer, then, to a few of these classes, as well as to the new industries which were unknown in 1851.

First, as to FINE ART.—With the exception of sculpture to a very limited extent, Fine Art was not represented

in 1851. Paintings in oil and water colours—frescoes, drawings, and engravings were not then admitted. The 1,400 English oil paintings, the 1,000 pictures from foreign countries—the 600 water colour paintings of the very highest quality and interest—the sculpture distributed over the building, placed where it can be best seen, and where it will most contribute to the general effect, will so distinguish this Exhibition from 1851, as, all other things being equal, to give it a present interest and permanent reputation far beyond its predecessor; and when the large proportion of the entire building allotted to English and foreign fine art is considered, it entirely removes from this great gathering of the world's art and industry, the foolish stigma which some have attempted to impress upon it—viz., that it has no other purpose or object than that of a commercial speculation.

It may be, and no doubt is, true that exhibitors expect to gain commercially by their contributions, but the gain to the nation is to be measured by other results than the profit of individuals. The greatest success nationally might entail a loss to exhibitors. A profitable result to them is, however, the best evidence of the novelty, beauty, and utility of the articles exhibited, and of the success, nationally speaking, of the Exhibition.

Without a reasonable probability of its being a commercial success to the exhibitors, could the public enjoy the inspection of such a wonderful display of the world's industry?—a display which nothing but the commercial greatness of the countries contributing to it could have brought together; and which affords the strongest evidence of the increasing power, wealth, and enterprise of the industrious classes of the world.

For the first idea of an International Exhibition, and for everything relating to the early history and progress of Exhibitions, their success, the evidence of the stimulus they afford to industry, we are indebted to that country which carries artistic feeling and design most thoroughly into every branch of its manufactures; and in 1855 France so far extended the example we set in 1851, as to admit works of fine art by native and foreign artists, thus filling up the void we had left, and supplying what was indispensable to the illustration of the progress of art in a country which from the earliest period had considered an artistic education as essential to its manufacturing success.

To ignore then this wonderful collection of pictures, drawings, engravings, and sculpture, freely contributed from private or public collections, English and foreign, and exhibited in the same building with the finest specimens of our art industries, from all parts of the world, and so placed as to facilitate comparison and examination, and thus to stimulate the cultivation of the taste for beauty in design and workmanship, and to call this a commercial speculation, shows a want of sympathy with the principle and object of this great World's Fair unworthy of any journal assuming authority to direct the public mind.

I shall not notice the respective merits of particular schools, masters, or pictures, or compare those of one country with those of another. I believe the collection fairly represents the schools of England, Belgium, Norway, and Denmark, though not so fully those of France, Italy, and Russia. We have never before had an opportunity of examining and comparing with our own school a large collection of the works of modern foreign artists of every country in Europe. As Englishmen, we have reason to be proud of the great artists we now only know by their works, Hogarth, Reynolds, Gainsborough, Old Crome, Turner, Calcott, Wilkie, Newton, Constable, and Leslie, as well as of those who are still among us, and who continue to delight us each succeeding year by their new and beautiful creations; and I am sure that they, more perhaps than any other visitors, will acknowledge the value of the instruction they will receive from being able to compare not only the productions of foreign artists, as works of art, with their own, but also their mode of manipulation.

Chromo-lithography must be mentioned here, for, although not strictly a fine art, it is certainly fine art to the million. But little understood in 1851, it now conveys beauty of design and composition to the minds and homes of those to whom nothing but the commonest coloured prints were before accessible. The Austrian and Zollverein pictures are particularly beautiful and cheap.

The collections of raw materials and other products from our Colonies and from India next require notice. The number of exhibitors in 1851 was 520, from 19 colonies; it is now about 2,000 from 31 colonies; and the articles exhibited are of far greater interest and value, as compared with 1851, than is indicated by the number of exhibitors. It is impossible to particularise the gorgeous specimens of manufacture from India, or the specimens of raw produce brought from each colony—they are various, rich, and interesting, and give unmistakable evidence of the vast supplies we may in a few years expect to receive from them; gold, copper, lead, and coal; wool, cotton, coffee, corn, timber, sugar, and every possible variety of tropical oils, seeds, gums, resins, and fibrous plants are here to be found, of the finest quality and of infinite variety, only wanting capital, labour, machinery, and time to bring them in almost unlimited quantities to supply the growing demands, and in many cases the decreasing supply, of the old world.

Then, as regards new industries, or those which, from the change that has taken place in the mode of manufacture, have become almost new industries; first, we will call attention to Photography, that new branch of fine art still in its infancy, but employing many thousand persons, and which is most admirably represented by English and foreign artists. It is not for me to say which country exhibits the finest specimens. French, Austrian, and English artists have all produced pictures showing great taste and most skilful manipulation. So great has been the progress in every branch of this art since 1851, that we may fairly expect, with the aid of chemical science, to see still greater advances in the next ten years. The apparatus and appliances exhibited for working in and out of doors are of much interest. One striking fact conveys a clearer view of the value of this art as an industry than any description. M. Voigtlander, a manufacturer of the most expensive lenses only, has just celebrated with his workmen the completion of his 10,000th lens; this gives some idea of the immense demand for apparatus of this character that has been created in the last few years.

CHEMICAL PRODUCTS (Class 2).—Here, among a great variety of beautiful preparations, we can record several new discoveries since 1851, from which most important industries have already arisen.

The new dyes—the specimens of which, both French and English, are remarkable for the scientific knowledge displayed in their discovery and for the skill shown in their preparation, are of great national importance, from the changes they are making in the art and practice of dyeing and printing and in the trade in dyes—introducing an easy and simple process for one requiring great chemical knowledge and most skilful manipulation, and substituting for an import trade of costly dyes and dye-stuffs, an export trade of valuable dyes produced from a residuum (coal tar) which till recently was almost a waste substance.

Sea-weed, hitherto all but a waste product, has recently attracted the attention of the scientific chemist, mainly from a prize offered for the best essay upon it by one of our distinguished members. Iodine, various new and important saline combinations, useful in dyeing, and pulp for paper, are among the new applications of this vegetable product of the ocean.

IMPLEMENTS OF WAR AND NAVAL ARCHITECTURE (Classes 11 and 12) formed classes in 1851, but the rifled cannon of Armstrong and Whitworth, the Whitworth and Enfield rifles, and the iron-plated ship, had no place there. Nothing can be better arranged to show every step in the construction of these new and powerful implements

of war than the collections from Woolwich, from the Whitworth Company at Manchester, from the London Armoury Company, the Mersey Steel and Iron Works, and the beautiful models from the Admiralty. Foreigners appear to confine their exhibitions in these classes to a few specimens of breach-loading and sporting guns, pistols, &c., of beautiful workmanship.

AGRICULTURAL IMPLEMENTS (Class 9), although very fully exhibited in 1851, may, from the successful application of steam power to so many new operations, be considered, in one of their most important branches, as a new industry. The American exhibitors claim attention in this department, though their exhibition is very small.

PHILOSOPHICAL INSTRUMENTS (Classes 13, 14, 15).—The increase in these classes is very striking. The rapid progress of scientific discovery at home and abroad since 1851 has increased the demand for and stimulated the invention of new instruments, as well as directed attention to excellence of workmanship. The great variety of apparatus required for photography, and for the beautiful and ingenious inventions of Mr. Wheatstone and others in domestic and general telegraphy, the instruments for spectrum analysis, to illustrate the discoveries of Bunsen and Kirschhoff—binocular microscopes—the new and educational museum microscope of Smith and Beck, with its three powers and 500 objects, are among the great variety of new and improved philosophical instruments and appliances invented since 1851, forming together a new and most important branch of industry, and employing a very large number of workmen from the highest class to those of more ordinary skill. I believe that in the number, quality, variety, novelty, and accuracy of workmanship, of the instruments exhibited in these classes, all constructed to enlarge the sphere of observation and to ensure the greatest accuracy in the pursuit of the various branches of science, we are surpassed by none, even if we are equalled by the long celebrated workmen of Paris.

The **EDUCATIONAL CLASS** (29) had no place in 1851, and shows the attention now being paid by all countries to the means by which the greatest amount of the most useful instruction may be conveyed to the pupil in the shortest time, and the models of school-houses and rooms, with the means of ventilation, show that attention is, but not a day too soon, being paid to physical as well as to mental education. All the great educational societies have assisted in making this collection. France, Prussia, Switzerland, and Norway have each contributed their educational appliances, and the comparison of them with our own cannot fail to be useful, and the practical mode of teaching adopted at the Agricultural School at Beauvais, as well as the simple but eminently useful models exhibited by foreign countries, deserve attention. The increase in the number of schools and scholars, and the consequent increased demand for maps, models, diagrams, and cheap apparatus for illustrating science, has raised this interesting class into a new branch of industry. I must here mention the exhibition, for the first time, of a drinking fountain—one of the indirect, but not less valuable, means introduced since 1851 to improve the physical, and therefore the educational, condition of the people.

PAPER (Class 28) may be noticed here, on account of the new and rapidly extending application of vegetable fibres in lieu of rags; and from the quantity of paper now made either entirely or partially from them, it deserves to be classed among new industries developed since 1851. England, Belgium, and the Zollverein appear to be equally alive to the importance of this branch of manufacture. The necessity for providing a new material for paper is best illustrated by the fact that, in 1851, Messrs. Applegarth exhibited their last improvements in printing machinery by which 10,000 copies of the *Times* were printed per hour. Now we have American machines printing 20,000 per hour, and there are several of them at work on our daily press, thus doubling in ten years our power to supply the

increased demand for information, involving, of course, a corresponding demand for paper. India, our Colonies, and Algeria have sent specimens of vegetable fibres, which appear to be adapted, as regards price, quality, and quantity, for paper materials. It may be interesting to mention that the Austrian catalogue is printed on paper made from maize fibres, mixed with cotton and linen rags; the French catalogue on paper made from maize and cotton rags.

I must now briefly notice those Classes in which old industries are exhibited, and point out a few of the most striking improvements since 1851.

MINING, QUARRYING, METALLURGY, &c. (Class I.), are much more fully represented than in 1851. In the English department there is an almost perfect representation of the mineral wealth of the United Kingdom, and our colonies have sent collections most carefully selected and most admirably catalogued, which show the enormous mineral wealth in these appendages of the British Empire, and which some would dis sever from the Imperial Crown because the protection of our commerce with them, now so thoroughly in its infancy, appears to cost a few millions per annum. Owing to these collections being divided, those of Great Britain being arranged in connection with the industries to which they belong, and each colony having its own, they do not produce the same effect as the magnificent series of mineral earths and rocks exhibited by the Zollverein and Belgium. The new industries belonging to this class since 1851 are those arising out of the discovery and application of aluminium and its alloys to the useful arts, the substitution of clays for iron in gas and other retorts, and the discovery in America and Canada of petroleum or earth oil, which appears likely to produce almost as great a revolution in the oil trade as when gas was first introduced.

SUBSTANCES USED FOR FOOD AND ANIMAL AND VEGETABLE SUBSTANCES FOR MANUFACTURES (Classes 3 and 4).—Although it has been said that the collection of raw materials from the vegetable kingdom in this Exhibition is not, as a whole, so perfect as in 1851, still, in many respects, it is superior to it. First in importance are the cereal products of the finest quality from our colonies generally—but our Australian colonies in particular have astonished the agricultural world by their wheat and maize. The wheats from these colonies weigh up to 70 lbs. per bushel—a weight rarely attained elsewhere. The collection of woods has never before been approached; we have it in planks, in sections of the tree at different ages, with and without the bark, in every possible variety for furniture and cabinet work, and also specimens of ornamental furniture made from these woods in the colonies. Here then we have food and timber of the finest qualities and in great abundance, waiting for the capital and industry of the mother country to bring it here for our use, creating new industries of the most important and enduring kind. The collections in these classes from France and other colonies appear to be very perfect indeed, and are most beautifully arranged.

MACHINERY (Classes 5, 6, 7, 8).—The most striking feature in these classes is the superior character of the machinery exhibited—its size and power—its workmanship. There is not much novelty, but each machine is very superior in every respect to that in the same class in 1851. In 1851 but one marine engine was exhibited to work the screw propeller. Now there is only one applied to paddles, and that is Swiss. The steam hammer is shown in every form of single and double action, English and foreign; only one was exhibited in 1851. The improvements in the manufacture of steel are strikingly illustrated by Mr. Bessemer and Mr. Krupp. Sewing machines, which were hardly in use in 1851, are now exhibited in various forms for application to different trades and classes of work. There is a great increase in foreign machinery exhibited, but every observer must be struck with the superiority of English workmanship. The models of engineering works executed at home and abroad by the

most distinguished engineers of the day since 1851 will be viewed with great interest.

MEDIEVAL WORKS, in Class 10, require special notice. It is possible that an ordinary observer, in passing through this class, may think there is a want of novelty in the forms and character of the articles exhibited, and that the effect produced upon his mind is not so startling as it was in 1851. But he forgets how much the study of the arts and industry of the middle ages of the period of renaissance has advanced, and how familiar the intervening period has rendered him with the examples in the best style which are collected and exhibited in the Kensington and British museums. Upon close inspection, he will find that, in material value, quantity, historical importance, and in design, the collection of 1862 far surpasses that of 1851, and that, for the purposes of the art student, it will be much more useful than its predecessor.

SURGICAL INSTRUMENTS (CLASS 17).—Great improvements have taken place in this very important class since 1851. We still maintain our superiority for quality, but in novelty of adaptation we are surpassed by other countries. Denmark appears to excel in some new adaptations; Italy and France have each produced most interesting improvements; but in quality, Russia, Italy, and Denmark appear to be inferior only to England, and all in this respect are, I believe, superior to France.

TEXTILE FABRICS—COTTON, WOOL, SILK, FLAX, AND HEMP (Classes 18 to 24).—These classes, from their immense importance to the industries of the world, will attract, as in 1851, great attention from English and foreign manufacturers. The English manufacturers, I believe, show a marked advance in design and taste, the practical result no doubt of the facilities for artistic education afforded to a large number of young persons during the last 10 or 15 years, through the exertions of the Department of Science and Art. This has, I am informed, excited the special attention of foreigners. The improvement in colour from the discovery of new dyes to which I have already referred, and in texture and quality, from the modifications made from time to time in machinery will, I believe, be appreciated.

But the improvement is most striking in our woollen and worsted fabrics, though, starting from a higher point in 1851, it is not perhaps quite so marked as the progress of Austria, which has made wonderful strides in this manufacture. Russia also shows much progress in printing and dyeing, but Saxony, the birth-place of the woollen trade, is far from strong.

In silk (Class 20) I believe we have every reason to be satisfied with our position, being inferior only to our great competitor in one respect, the artistic treatment of colour in design. In quality of colour and of fabric I am informed there is little to be desired. There are, however, two specimens of brocaded silk from Lyons (No. 1,871 in the Catalogue), superior, I am informed, to anything ever before produced from the loom. They are equally remarkable for taste in design—beauty of colour, and skill in workmanship.

In cotton (Class 18) I fear we are not quite so fully represented as in 1851. The names of many of our largest manufacturers in Manchester and Glasgow do not appear as exhibitors. Enough however is I hope exhibited to show the progress of design, the brilliancy of our new colours, and the accuracy of our printing, and thus to maintain our position as the first manufacturers in the world.

FURNITURE AND DECORATION (Class 30).—The furniture exhibited by our best makers, either in wood or metal, can, I think, safely challenge competition with any foreign work. As an example, I would refer to the oak sideboard in the nave. Here again we mark improved design and execution, which, beginning in the highest class, gradually descends and improves that which is made for the use and ornament of the more humble habitations. Carving, applied to furniture—imitation of valuable woods by the painter and japanner—the general adoption of a

purser and more simple taste in colour and design, whether in furniture made of the most costly or the cheapest materials, all give a special character to the goods exhibited. Processes for ornamentation which are now common in England, had scarcely one example in 1851. The display of Austrian and Prussian furniture of certain descriptions will attract great attention from its beauty and cheapness, and excite our workmen to fresh exertion. Bronzes, objets d'art, &c., which appear to be almost monopolised by France, are of great beauty, and among them are very interesting new works in copper and lead for architectural purposes.

HARDWARE, STEEL, AND CUTLERY (Classes 30 and 31).—We have scarcely a competitor in these classes; and it is the beauty of the workmanship, rather than any novelty or new invention, which will attract attention. And this observation will apply to the smallest as well as to the most ponderous articles included in these classes.

GLASS, CHINA, EARTHENWARE AND POTTERY (Classes 34 and 35).—It is difficult to say in which of these industries the advance has been the greatest. On the whole it appears most visible in glass, which is of the finest quality and ornamented with designs, the execution of which has never been surpassed. Indeed it is only in the last few years, since the repeal of the excise duty, that any substantial progress could be made in this beautiful manufacture.

In plate and other ornamental glass our superiority is not so clear. France, Belgium, and Austria, have each contributed beautiful specimens, which cannot fail to be admired.

China must be divided into ornamental, and useful. In purely ornamental it is much to say that we can challenge competition with Sèvres and Dresden, but in useful china, of high quality, in porcelain and earthenware, we are superior to all in quality, design, colour, and price.

There is some very good common china and earthenware from Italy, and some very cheap from Hungary, but these are copies, in form and design, the Italian mostly from English patterns, and the Hungarian from those of Japan and China; there is no national character about them.

In pottery we are also in advance of all.

The improved forms and cheapness of our rough ware are universally admitted, and our encaustic tiles and terracotta are deserving of great attention.

Our chemical apparatus is admirable in manufacture and variety, whilst the increased use of glazed drain pipes in the last few years, has almost created a new and valuable industry.

Such, then, is the brief and imperfect summary of the contents of this Exhibition which the time allotted to these papers enables me to give, but which, I hope, is enough to illustrate the views of those who have taken an active part in bringing this vast collection together.

In every department progress since 1851 is manifested in a degree unexpected by the most sanguine. Our trade has in the same time increased more rapidly than in any similar period in the history of the empire. How far this is to be attributed to the stimulus the Exhibitions of 1851 and 1855 gave to the industry of the world each must form his own opinion; the old jealousy of allowing rivals, especially foreigners, to see what each was doing has passed away, and every intelligent manufacturer now relies upon a reputation gained by the most universal appreciation of his skill. But for International Exhibitions we should not possess a vast amount of useful information, gathered from all countries, of great value to art and industry. It is by comparing each Exhibition with its predecessor that we are able to ascertain, to record, and to profit by the progress of every country in each 10 years; and this interchange of useful information enables all to appreciate the advantages belonging to the pursuit of each industry where it can best be conducted, and must lead to economy of production, to the advantage of labour,

to the extension of commerce, and to improved commercial relations between manufacturers and producers in all parts of the world.

We have next to consider whether we are making the best use of the great advantages this wonderful collection of human industry places within our reach.

I think it cannot be disputed that the highest object of an International Exhibition is the collection and dissemination of the most accurate information concerning the arts, manufactures, and commerce, of all countries, thus illustrating the political, social, and commercial condition of their people. Another purpose is the collection of specimens of the mineral, animal, and vegetable productions, or of raw materials, from all parts of the world; but this is of secondary importance, as they can always be procured in the ordinary course of business by those interested in any particular branch of trade. But our workmen cannot obtain the information they require by any other means than those afforded by International Exhibitions. A workman may occasionally see a specimen of foreign handiwork, but he has no particulars on which he feels he can rely of its cost or the mode of its production. It may be a specimen only shewn to him to depreciate the value of his labour, and by reason of this uncertainty, it is sure to excite his jealousy and prejudice against foreign workmen. He cannot know the real position it holds in the country where it has been made, or whether it fairly represents its available mechanical skill. This information he can only acquire by the examination of foreign labour in various stages and forms of manufacture, and where can he obtain such knowledge but at an International Exhibition? To him the comparison of manufactures from all countries, and of many different specimens from each, is invaluable. No Mechanics Institution can give him such useful knowledge, no teaching in the Department of Science and Art can give him such instruction, as he will derive from a few hours spent in inspecting the work, in its various forms, of his foreign rivals. To the intelligent and skilful workman an International Exhibition is an industrial college, teaching in the most practical manner—educating the eye, the hand, and the taste—stimulating industry and ingenuity—removing prejudices, and, by enlarging the sphere of observation and giving new ideas, making better workmen.

The importance of this inspection is very strongly felt in France, not only, as I shall subsequently shew, by the numbers admitted to the Exhibition in 1855, but by the arrangements now being made for the careful examination of every branch of industry at this Exhibition by working men. Independently of clubs to bring over numbers of working men cheaply, there is a special sum appropriated by the Imperial commission to pay the fares of deputies to be elected from the great body of each trade by their fellow-workmen.

Feeling, then, as strongly as I do the invaluable effect which the inspection of this Exhibition must produce on working men, I am led to ask if it can produce results of the same national importance on the upper classes. I think it cannot; nor is it necessary that it should. No doubt it will elevate the estimation of the manufacturer in the minds of many it amuses; surprise and excite wonder by the intrinsic beauty and exquisite workmanship of the articles exhibited, and by the wealth of which it gives such striking evidence; flatter the national vanity to see England's superiority in so many branches of industry; but where, among these classes, can it afford industrial instruction, or stimulate industry, or produce any permanent result calculated to maintain the supremacy of England's manufactures?

But when we turn to the middle and industrious classes we find, besides the pride they feel, in common with all, in the collection of the world's industry, a high appreciation of the great benefits they must derive from the practical instruction they receive at these International Exhibitions. They prove their sincerity by providing the security on which the

money is raised for the erection of the building—they supply it when erected with the wonderful collection it contains, and then, by their anxiety to inspect the works of all countries, of their rivals at home and abroad, find a large portion of the funds by which the expenses of management are to be paid.

In 1851, Season Tickets, and 20s. and 5s. admissions, produced	£67,514
The 2s. 6d. admissions	72,447
And the 1s. "	221,271
In 1855, the 5fr. admissions produced	£6,735
2fr. " "	7,663
1fr. " "	83,904
4 sous " "	17,459

So that the working classes of Paris, at 4 sous each, paid more than the 5fr. and 2fr. admissions together, and besides being visited by more than 2,000,000 of people paying but 4 sous each, the Exhibition was open free on one Sunday before it closed, when a vast number were admitted who would not otherwise have seen it. The numbers then admitted were enormous, but no account was taken of them.

I have drawn this comparison because I conceive it to be true and just, and necessary to illustrate the view I take of the proper mode of making the utmost use of these most valuable of modern institutions. Their object is undoubtedly to disseminate information among the great mass of master manufacturers and men in all countries, to improve their taste and stimulate their industry. Any arrangement which excludes the great body of those for whose benefit such institutions were inaugurated, is inconsistent with the broad principles of universality upon which they are based; such exclusion is in antagonism to the publicity which is demanded now-a-days in every sphere of action. It checks the operation of the principles of free trade, for what is the use of free trade by law, if, when we have the opportunity of teaching our workmen how to compete with their foreign rivals, we refuse to allow them to take advantage of it. Unless this is done, a demand is created for foreign works and our own producers are prevented from learning how to compete with them. You thereby injure the workman, the dealer, and the merchant.

How, then, do I apply these observations to the present time? I say we open the Exhibition too many days in proportion to the rich, and too few to the workmen. We do not give to our workmen the advantages given to the French workmen. I believe in the low tariff to produce good pecuniary results. The penny postage stamp produces more than the eight-penny or shilling letter. I have greater faith in the realisation of a large sum by a low tariff than by a high one. I would not open the Exhibition every day at the lowest rate; but whilst, in the interest of science and of instruction, and I may say of fashion, I would have one day weekly at a comparatively high rate of admission, and other days at one shilling for the general bulk of the visitors, I would devote certain days weekly to still lower rates, and as exclusively as possible to working men. Let them feel that an International Exhibition has a truly national object—that they are to derive benefit from it, and then they will learn to appreciate more thoroughly the sacrifice of time, the labour, mental and bodily, which have been required to bring such collections of industry together, and they will retire from the examination of these triumphs of skill and manufacturing industry better satisfied to contribute towards and to aid the exertions which are being made to improve general education, and to enter more fully into the importance and the utility of the large votes for educational and artistic purposes which every year pass the legislature.

In the presence of our chairman, I am almost afraid to state all I feel on this part of my subject; but I am sure he will forgive me when I say, that I fear that the Commissioners are not, as a body, sufficiently reliant on the great principles of political economy, which assure us that the

safest and best principles of government are those which give the greatest happiness and instruction to the greatest number. Look at the large sums we are now annually spending in education, in teaching the principles of science and art. Ought we, then, to neglect an opportunity like this, which can only recur at comparatively long intervals, of advancing the education we have begun, and of showing the practical effect of knowledge and industry and how to obtain excellence and the rewards which belong to it. If it can be shown that by the proposed arrangements for admission we do give to our intelligent and educated workmen all the advantages this wonderful exhibition of the world's industry is calculated to afford them, and at the same time secure the largest receipts, my argument falls to the ground; but looking to the examples before us—especially that afforded by the French Exhibition of 1855—it appears to me impossible to arrive at that conclusion.

The question of prizes comes naturally under this division of my subject. The arrangements for this year are an improvement upon 1851, as there is only one description of medal to be given, and that for excellence only; so that many may be given in the same class, and much injustice thereby avoided. The balance of opinion appears so strongly in favour of prizes, that we must hope the jurors will distribute them so freely as to secure this acknowledgment to every one whose articles exhibited give evidence of special merit, whether of invention, workmanship, materials, taste, cheapness, or general applicability to the object in view.

The next question is, what is the right period for the recurrence of such exhibitions? I think I may assume all will agree that their too frequent recurrence would, in fact, render them almost useless for the great purpose they are intended to accomplish—viz., that of marking clearly at intervals the progress of the world's industry. Looking, however, at the decided progress in the past ten years, I think we may safely assume that to be a proper interval between exhibitions. It affords time for new inventions—for working out practically the new ideas of the previous exhibition; and the increase of population, and the change which annually takes place in it, produces so large a number of new exhibitors and visitors as to ensure popularity and support. If then we could confine International Exhibitions to England it would not be difficult to determine the period which should intervene between them, or even were they to be limited to England and France. But such is the value set upon them by other nations, which have contributed very largely to the Exhibitions of 1851, 1855, and 1862, that it is impossible, in considering this question, to confine our view to those two countries.

There are 31 foreign countries contributing to the Exhibition. There are about 18,000 foreign exhibitors. France supplies between 5,000 and 6,000, the Zollverein above 2,000, Italy 2,700, Austria 4,000, Spain 1,100, Portugal 1,000. Great Britain was represented by just under 1,600, and her colonies by about 1,000; or together, 2,600 exhibitors in Paris in 1855. These being the facts, it appears reasonable that whenever France, the Zollverein, Italy, Austria, Spain, or Portugal desire to hold an International Exhibition, and are prepared to supply proper accommodation for it, so long as we expect them to contribute a full and valuable collection of their art and industry to our Exhibitions, we must be prepared to do the same to them.

We have, then, to consider how this difficulty is to be met, for should a decennial period be considered as that most desirable for England and France, that is, an Exhibition in either country, each five years, what should be the period, if Exhibitions are also held in other countries from which as many, or nearly as many contributors have come to us and to Paris as we sent to France, or should we refuse co-operation with them if they desire it?

Before we can decide this question we must inquire how far the Governments of these countries would inter-

fere in the management of such Exhibitions, and how far each has contributed hitherto and would contribute, were they to be held more frequently, to the expenses incurred by exhibitors in sending their goods to foreign countries.

At present we have three instances from which to draw conclusions. England in 1851; New York in 1853; France in 1855. The Exhibition in 1851 was, as we all know, begun by our Society, acting under the advice and direction of our late Royal President, by whom it was soon expanded into an International work. The entire expenditure, paid by the money received from the admissions, amounted to £320,000, and there was a large surplus besides.

That in 1853, at New York, was a private speculation, and was an entire failure. All we can clearly deduce from this failure is that something more than a pure mercantile speculation is required to ensure success to an International Exhibition. That in 1855, in Paris, was a great success in every respect but in a pecuniary point of view to the Government.

The cost of the building was little short of £500,000, and that of the management about the same, both being defrayed by the Government, less the amount of the receipts for admission, which were but £128,000. The experience gained by the Exhibition of 1851, no doubt induced the French Government to incur this great expense for a permanent building for the greater part of the collection, instead of imitating our light and almost fairy structure. The determination to make the main portion of the building permanent and substantial, led to the large expenditure as compared with ours in 1851, and justifies that incurred by our Royal Commissioners on the buildings for 1862.

The English Government appropriated £50,000 to the expenses of conveying the goods of English exhibitors to a French port, and for the cost of the superintendence in Paris. This sum was placed under the control of a committee presided over by Mr. Cole, and the amount expended, everything included, was only just above £40,000, £10,000 less than the estimate, a saving caused mainly I believe, by the French Government taking charge of everything at the port of entry and defraying all the expenses of the carriage to Paris.

The French Government in 1851 and this year have paid every expense connected with the transport and exhibition of the goods sent here for exhibition, and the amount so paid in 1851 was about 1,200,000 frs., or £48,000, and I am informed that this sum will not be exceeded this year.

I am unable to state with accuracy the expenses incurred by other nations, but I have reason to believe it is small compared with that spent by England and France; but the principle of each Government bearing the expenses of transit and of exhibition appears to be adopted by all. Unless, then, we are prepared to follow this example in every instance, as we did in 1855, our art and manufactures will either be unrepresented, or will appear under very unequal conditions. We may fairly assume that at a cost of from £40,000 to £50,000, we can secure a proper representation of English art and industry at any continental Exhibition; but if we be inclined to bear this cost, can we expect that owners of valuable works of art, and the manufacturers of large and expensive machinery, will exhibit the one or the other except on special occasions and at distant intervals? I fear not.

The determination, then, of the proper interval for the recurrence of International Exhibitions is full of difficulty; and the only plan I can suggest for the collection of information upon which we can arrive at some satisfactory determination is for our Society, at an early period, to open communications with the proper authorities, in countries likely to desire to hold International Exhibitions, in order to arrange that they shall not be too frequent, or at cities too distant from the coast, to interfere one with the other, or to preclude the support they require for success. Of this we must feel assured, that, in future, they will not be sup-

ported unless, from the experience we shall acquire before this Exhibition is closed, the world at large is satisfied that such gatherings are universally beneficial. To inaugurate a new Institution required the countenance, support, and personal position of our late Royal President; but such aid would fail in inducing people, from all parts of the world, to incur the serious expense and anxiety of sending goods thousands of miles, if they could see no prospect of benefit arising therefrom; and certainly the support of those who take the foremost place in promoting all works they believe likely to produce great national and international results, and who are willing to contribute to the general collection, works of art of great value, which the public can never see and enjoy but by some such means, and without which an exhibition would lose a great portion of its attraction and utility, cannot be again obtained unless the results of this Exhibition show clearly that, since 1851, industry has been stimulated, art improved, public taste purified, and the general intercourse between nations promoted.

It has been no trifling difficulty to satisfy the public, in 1862, recollecting the Exhibition of 1851, and at the expiration of another ten years that difficulty will not be lessened. I am sanguine, however, that all minor difficulties will be forgotten when, in October next, we can, by the aid of the reports of the jurors, clearly indicate what influence the Exhibition of 1851 has had in urging forward the marvellous progress which their reports will record in the past eleven years, and that, satisfied with such results, we shall look forward to still more brilliant success in future, and feel grateful to those who have undertaken and carried to a successful issue the Exhibition of 1862.

We will now proceed to inquire whether the Exhibitions of 1851, 1855, and 1862 have produced the good results anticipated from them, whether they have stimulated industry, and whether they have promoted good-will among the great nations of the world. Many will reply at once, and consider it a perfect answer to the inquiry, that there has been more war since 1851 than there was in the 20 or 30 preceding years. This may be quite true, and yet it may not be difficult to prove that, notwithstanding the Russian and Italian wars, both hotly contested, but more speedily terminated than any previous wars begun on a similar scale, the improved tone of feeling among the nations of Europe and between their governments, and which enabled us to hold the first International Exhibition in 1851, has been still further and more rapidly improved since that time by the influence of the French Exhibition of 1855. The very great increase in the number of foreigners who visited England in 1851 beyond those of any previous year, and the annual increase since that time, is of itself evidence of great value. The correspondence, however, between the two countries affords the most certain evidence of increased intercourse. In 1851, the year of the Exhibition, the number of letters was 2,495,375. This number increased steadily, at about the rate of 4 per cent. per annum till 1860. In 1861 the increase was nearly 25 per cent., and the total number of letters which passed between England and France was 5,438,225, an increase of nearly 120 per cent. in ten years. But, besides this, we have the acts of foreign governments, which prove that in their opinion increased facilities of intercourse with England have been and are mutually beneficial. Independent of the evidence afforded by the commercial treaty with France, we have the great fact of the abolition of passports for Englishmen by several of the most important governments in Europe, a boon of great value not only for the commercial facilities it affords, but for the confidence it exhibits in the English character. But whilst international communication is facilitated between certain European countries and trade increased, what evidence have we that the industry of the world has been stimulated, and that we as a nation have derived benefit from these Exhibitions? In a period so short as ten years it is not so difficult to mark progress as to trace that progress to its right source. We must, then, be content to say

that, coincident with our adoption of those liberal feelings which prompted the first design of an International Exhibition, and their acceptance by foreign countries, we have a steady and most decided increase of trade and intercourse between the various countries of Europe and the world. We see the distrust which was unmistakably shown abroad in our fair and honest intentions when the invitations for co-operation were first issued in 1851, replaced by the most entire confidence in 1862, and the number of foreign exhibitors nearly doubled. We have benefited from the unrestricted comparison of the industries of both countries in the exhibitions of 1851 and 1855. Each saw that it possessed advantages in the production of certain articles of commerce and of general use; and, using the knowledge so obtained, we have, by abolishing prohibitory duties, promoted those industries for which each country is best adapted, and thereby bound our commercial interests more closely and firmly together.

Here, then, is the evidence of the general benefit derived from these accumulations of the world's industry under one roof, and open to the inspection of all—here is the evidence of the confidence this universal contribution of industry of all kinds, from all nations, inspires, increasing good-will among people who, till lately, had little accurate knowledge of each other, and still less of the actual state of their respective industries. Besides, the all but universal interchange of postal facilities, and the adoption of our system of stamps, by which postal arrangements between the various countries of Europe are much facilitated, are strong evidences of a mutual desire to encourage intercourse. No one will pretend that these changes are to be attributed entirely to the effect produced by two International Exhibitions, but they prove that the confidence each nation has in the other has been gradually strengthening and increasing, rendering restrictions on intercourse needless, to the great benefit of all.

Surely then, we are not wrong in assuming that the improvement which has taken place in the fiscal regulations between France and England was much promoted by the information obtained at the Exhibitions of 1851 and 1855. They caused an immense increase in our commercial intercourse—they taught us each other's industrial power—and with the specimens of our own industry and of those of foreign countries now before us we can safely say, that whilst in no former similar period has there ever been such progress as in the eleven years just passed—progress, especially, in the improved and cheaper production of everything which enters into the every-day life of the people of every nation participating in these exhibitions,—England, perhaps more than any other, has derived great advantages from them. No one who remembers the articles exhibited in 1851, in earthenware, hardware, glass, furniture, and all the innumerable comforts and necessities of life, can doubt this beneficial movement.

If I am correct in these conclusions, and in this statement of the facts on which I base them, there can be no doubt that International Exhibitions do promote the industry of the world, have thereby been productive of general good, and must be beneficial to us, as well as to every nation contributing to them; and I trust, again quoting the words of his late Royal Highness, "that now the products of all quarters of the globe are placed at our disposal, we have only to choose which is the best and cheapest for our purpose, and the powers of production are entrusted to the stimulus of competition and capital."

International Exhibitions cannot benefit any one nation exclusively. We must be satisfied that there is room for the success of all, and that the country which displays the most energy, skill, and judgment will, in the end, derive the greatest benefit from them.

Thus I have endeavoured, feebly I fear, to record what has been accomplished during the past eleven years, as shown by the Exhibition now before us. But it is impossible to conclude this review of the progress of industry since 1851, without recollecting that during this

period, in which so much has been done—in which so much talent, science, and industry have been devoted to the art, manufactures, and commerce of the world, there have been two European wars begun and ended; we have quelled a mutiny on a most gigantic scale, threatening our largest, richest, and most important possessions in the East; there has been a war with China; wars with the aborigines in our colonies—some begun and finished—but one still raging; our trade with America, by its internal dissensions, has been almost destroyed, and our most important industry at home thereby paralyzed.

Every important State in Europe, as well as the great Republic across the Atlantic, has been getting year by year deeper into debt, to the extent, in the aggregate, of £500,000,000, spending this immense sum either to coerce their subjects, or to check the progress of independence, or out of pure rivalry and jealousy of one another's power, thereby crippling the industrial resources of mankind. If, while industry has been so heavily taxed, and the labour of so many thousands withdrawn from it, it has advanced more rapidly than was ever known before in a like period, have we not a fair right to attribute a portion of this movement, and not a small one—to the effect produced commercially, industrially, and socially by the two International Exhibitions already held, and the anticipation of and preparation for that now before us? And if such results have been realised during the past ten years, what may we not expect if it please Providence to allow nations to learn wisdom by experience? wisdom to avert war by the study of the records of death, disease, and crippled industry which follow in its train; wisdom by the study of the arts of peace, and the happiness and contentment, the political and social order it produces; and wisdom to study the results, equally clearly marked by every step taken in the direction of free trade, of removing shackles from industry, and of reliance upon the loyalty of a contented and industrious people—then, indeed, we may expect greater results in the next ten years than those, great as they undoubtedly are, of the past decennial period. Greater or even equal waste of industrial resources in a similar period by the governments of the world it is hardly possible to conceive. It is, then, a proud position for this Society, having originated International Exhibitions, to be able to point to the Exhibition of 1862 as fully justifying a course of action persistently pursued for many years; and I trust the Council will continue to be guided by the principles it has hitherto adopted, remembering, in all it undertakes, the wisdom and prudence, yet promptness and liberality which distinguished our late illustrious President, and then I fear not that an increasingly useful and honourable career is yet before it, and that at some future but not too distant period, the Society will again become the promoters of another International Exhibition.

DISCUSSION.

Mr. MARSH NELSON said it struck him, while listening to the account so ably given them of the mode of classification adopted in the Exhibition, that on any future occasion they should arrange the articles in a different manner. If a classification had been adopted with regard to manufactures and arts, instead of by countries, it would have been more convenient. Take, for example, the article of glass. It was difficult for a person to travel from the British exhibition of glass manufactures to that of Austria, and carry in his eye the different qualities; but if all the glass productions had been arranged together—French, Austrian, and Hungarian—they might easily compare them and judge which was the best. This mode of arrangement was adopted with regard to pictures, and he did not see why it should not be for shawls, laces, and other manufactures. They had all been placed in one gallery, and it was possible to compare one picture with another. But with respect to every other description of

art or manufacture, they had to travel from one part of the building to another in order to institute any comparison. In the case of the present Exhibition he noticed, the other day, that in the central nave there was one of Peters's four-horse drags side by side with a toy stall; and on the opposite side a display of Worcestershire china was followed by a model of the North Foreland lighthouse. He thought if all the drags had been put together, and all the china and all the toys together, it would have been a more useful arrangement than that which had been adopted on the present occasion; and in any future Exhibition, whether in this country or in France, he hoped this plan would be carried out—and that a building would be erected so that each part might be suited to the particular class of objects to be exhibited. Skilful manufacturers were in the habit of erecting warehouses suited to the particular quality of manufactures they had to exhibit. He had been recently much struck, in going through a large private building erected for the display of silks. A particular kind of light was given for their advantageous display, and special colours on the walls. With regard to the arrangement of the pictures, it appeared to him that it would be a great improvement in any future Exhibition if they were arranged chronologically. By that means the artist would be able to see the progress which had been made. The next point which he thought they might discuss with advantage, was the building itself. The gentleman who had given them this able comparative account, had rather slurred over that part of the subject; and, whilst he had spoken of the present Exhibition as being superior in almost all respects to those of 1851 and 1855, the only matter on which he expressed any doubt was with regard to the building. He (Mr. Nelson) would point out a few instances in which he thought errors had been committed in the present building, not with a view of cavilling, or of throwing blame upon anybody, but in order that they might guard against those faults in future. He had taken a sketch of the building, as given in one of the numerous guide books, and, supposing they entered from the Exhibition-road, there was no protection in the way of a vestibule, or any place where a body of people could be marshalled previous to entering the Exhibition. They came, in the first instance, to one of those enormous domes where the glare of light was excessive, and all after that appeared dull and melancholy in comparison. The great secret of all art in such matters was to keep back the effects they wished to produce till the last moment, rather than to thrust them all at once upon the eye of the observer. On entering, instead of making an ascent, they descended several steps on either side to get to any part of the building; that was not only inconvenient but detracted from its dignity and imposing aspect. They then walked along till they came to what was designated the central transept, when a feeling came over them of the lop-sidedness of the building. What was the cause of that? It was because on the left hand side they looked up and saw a glass roof with abundance of airiness and light, whilst on the other side there was an exceedingly ugly brick wall. The result was lightness on one side and extreme heaviness on the other. The next point was, that on leaving the French courts, the effect on entering the nave was most depressing, because they had not the same amount of light as they had at the sides; but then it might be said that decoration came to the aid of the architect, because, although they did not see the sky, they had the nearest approach to it in the grey colouring and cheerful decoration of the ribs, rendering them as much like Tunbridge ware as could be conceived. He did not think that was exactly the style of decoration suited for a great national building like this, and that it had better be avoided on future occasions. Upon the plan the central part of the building was called the "central transept." Now, when he paid his first visit he looked for the so-called central transept, and walked from the dome at one end to that at the other end, and he

confessed he was not able to discover which was the central transept, till a friend suggested to him where it was, and then he saw nothing but a statue of Moses facing one of Garibaldi. Walking to the Cromwell-road entrance, he found again, instead of a vestibule, there was another red brick wall adorned with carpets, whence, turning right and left, an entrance was gained to the picture gallery. A more unartistic arrangement he had never seen. They then ascended to the picture gallery, which in extent, height, and dimensions, was all that could be desired; but it appeared to him that a large gallery was not the proper place for the exhibition of pictures of all classes. The noble lord in the chair had travelled a great deal, and many present had no doubt done the same; but there was one thing which must have struck everyone with regard to the picture galleries abroad, namely that instead of having one large continuous gallery, there were a number of small rooms in which the cabinet pictures were exhibited. However good the large gallery might be for the exhibition of gallery pictures, the cabinet works were lost in it. From this gallery they passed into the smaller galleries appropriated to the water colour pictures. He would say no more of them than to characterise them as unseemly railway sheds, only to be compared to their neighbours, the Brompton Boilers. Passing through these galleries, and proceeding to the western dome, they saw what a mistake it was to make these domes a part of an Exhibition building of that kind. As far as exhibiting objects was concerned, they were unsuitable, because it became positively necessary to shut out a great portion of the light from the domes by awnings. Everything about the domes was wrong, and, taken altogether, he regarded them as most inartistic structures. Then he would call attention to the want of design in the terminus of the vista of each transept. At the end of the transept they found a large opening, leading into the carriage department, which must strike everybody as closely resembling a catacomb, and more suited for the exhibition of hearses than carriages. That portion of the building had evidently been sacrificed for the sake of the gallery over it. In another Exhibition he hoped that would be avoided, as it showed that a two story building was not appropriate for such purposes, because in the lower floors everything was sacrificed to the floors above them. On the occasion of a paper being read, at an early period of the session on the Exhibition of 1862, they were told that they should reserve their opinion of the building until it was opened. They had done so, and not only that, but they had waited to hear the opinions of people from every country in Europe, and he had no hesitation in saying this building was a national disgrace. Let them not imagine for one moment he intended to say anything against the gentleman—able, no doubt, in his own profession—who designed this building. On the contrary, he considered him an ill-used man. He believed he was not anxious to have this work put upon him. The Royal Commissioners were told, as plainly as words could be spoken, that Capt. Fowke was not the right man in the right place, but, notwithstanding that, notwithstanding what they must have seen when they went to survey the ground, notwithstanding the contiguous building, the Brompton Boilers, was known to have been the design of the same gentleman—[Mr. H. COLE, "No, no"]—they still persisted in adopting his design for the building. With regard to Mr. Cole's contradiction, he (Mr. Nelson) would say that common report erred, inasmuch as the design of the South Kensington Museum was attributed to Capt. Fowke. He had no doubt it would be argued that, as this was only a temporary building, it was unfair to judge of a man's architectural abilities by such a structure, but he would call to their mind that a detailed plan and description of proposed alterations of the National Gallery were published in the *Cornhill Magazine*. This was a design by Capt. Fowke for a permanent building, intended for a national picture gallery. Now he (Mr. Nelson) contended that with that design before them the Royal Commissioners showed great indis-

cretion in employing a man who could propose such a plan as that. No doubt Capt. Fowke had done his best, but he (Mr. Nelson) found fault with those who employed him, and who thrust upon him a work which he was unable properly to perform, and which, he contended, had brought down a national disgrace upon the country.

Mr. GERSTENBERG (Commissioner for Ecuador) said the gentleman who had just addressed them had shown that criticism was easier than the practice of art. He had spoken with a fluency which showed that he had well studied the subject; but though the paper read was upon the International Exhibition of 1862, the last speaker had only very lightly touched upon that subject. His remarks had been principally addressed to a criticism of the building, which was only a part, and in his (Mr. Gerstenberg's) opinion not the most important part, of the Exhibition. As one of the foreign Commissioners he would bear his testimony that the present building, for all practical purposes of an exhibition, was superior to that of 1851 and to that of Paris in 1855, and possessed many advantages which those buildings did not enjoy. One great merit in the present building, he considered, was, that the entrance was immediate. They had not to pass through long vestibules, as suggested by Mr. Nelson, and in this respect he thought it was an improvement upon some of the public buildings on the Continent. Mr. Nelson had omitted to state one objection which had been generally taken by foreigners with regard to the building itself—that was, that it had no central point; that the duality occasioned by the two domes detracted from the unity of the building; and that there was an absence of the grand effect produced by the central transept in the building of 1851. He, in common with other foreign friends, entertained no doubt, if the present experience had been possessed when the structure was erected, a great many faults which had been mentioned would not have been committed; and undoubtedly they would be avoided in future—but he must say, with respect to the merciless remark that the building was a national disgrace, that if any future building were entrusted to any one individual—even if he were Mr. Nelson himself—he would not be able to satisfy all parties. He would say one word with regard to the great importance and usefulness of such Exhibitions, as shown by the readiness with which everybody was now prepared to offer an invitation to others to witness the secrets of his trade and manufacture, throwing them open to the inspection of the world at large. He recollected some years ago that the manufacture of machinery was carried on under the greatest secrecy, and the trade was kept as a profound mystery; but at the present moment they saw that false doctrine exploded. The consequence of the former system was that nobody was able to learn anything of his neighbour, and the development of machinery was very slow, but at the present time there were mechanical inventions from all parts of the world open to the inspection of every one, and this was a matter of the greatest utility. With regard to articles of raw produce, there was a great question at the present time as to the supply of cotton in England and silk in France. The people of the latter country were apprehensive that they might be visited with a similar commercial calamity with regard to silk which England had experienced with regard to cotton, and they were now endeavouring to introduce the cultivation of silk into every country where it was possible. The world had been rather surprised that the people of Manchester had not taken the steps which seemed so necessary with regard to cotton; but he believed the present Exhibition would lead to great practical results in that direction, because there were samples of cotton from various parts of the world where hitherto it had been only scantily produced, and scarcely any of it imported into England; this must open the eyes of the British public, if it did not succeed in awakening the people of Manchester to the fact, that it was not their duty to allow the working population of Lancashire to be pauperised,

but to try to procure the raw material, which would make them prosperous labourers. He would only add, that the foreign commissioners were in nearly all respects satisfied with what they had seen of the Exhibition, and with the courteous and cordial hospitality which had been extended to them.

Mr. G. A. SALA, as one of the public, might be allowed to say a few words on an essentially public question. With regard to the contents of the Exhibition he had viewed them with satisfaction, wonder, and admiration, but with respect to the building he might, as one who had given some attention to art, say a few words. Mr. Nelson had characterised the building as a national disgrace; he (Mr. Sala) did not consider it a national disgrace but a national mistake, and for this reason: It would be in their recollection that in 1851, all eminent men as architects and designers were called upon to send in plans for the Great Exhibition, and they all recollected what hideous, monstrous, and abnormal designs were sent in on that occasion, and he remembered how his eyes were horrified by some of these designs. Those designs were mediocre, common-place, every-day things, but it occurred to Sir Joseph Paxton, by what he would term an inspiration of genius, to send in the design of the Crystal Palace of 1851. He repeated, that was an inspiration of genius, and that design threw far into the shade every other architectural plan submitted to the commissioners; but it was due to the architects of the country to state that whilst the design of Sir Joseph Paxton was a marvellous combination of iron and glass, it was common-place in its form, and, as originally conceived, presented a resemblance to three packing cases piled one upon the other, until the late Sir Charles Barry added the transept, and that addition made it the beautiful thing it was. As regarded the Exhibition building of 1862, he considered that various errors had been committed. The building was certainly not magnificent; indeed, in his opinion, it might almost be called hideous. The picture galleries certainly were light, commodious, and spacious; and albeit he agreed with Mr. Nelson that there was a want of smaller adjacent apartments in which the cabinet gems could be displayed with advantage, instead of being lost amongst the mass of larger pictures, he must say the picture galleries of the Exhibition were amongst the grandest and most satisfactory features of that otherwise most unsatisfactory building. But in this the error was committed. They did not expect perfection in the building, but they did expect a building which should equal if it did not surpass that of Sir Joseph Paxton. But did they go to work the right way to get a building which should either rival or equal the former one? Were the most eminent architects of the day consulted as to the building? As one of the public he was taken by surprise—not at the announcement that another Exhibition building was wanted—but that Captain Fowke had been appointed to construct it. If ever there was a deed done in a corner, it seemed to him to be that which was done by the Royal Commissioners, or by some one, he did not know who, some mysterious body, some conclave sitting in an underground building, meeting together, wrapped in robes of mystery, who said, “Fowke, and Fowke only, is the man.” But he might be allowed, whilst decidedly expressing, as he believed, the opinion of a not wholly unimportant section of the public, that the present building was an infringement of all the canons of good taste, to say that he did not think Captain Fowke was so much to be blamed for what he had done. What more could he do? He was, doubtless, an able officer of the Royal Engineers; but did the Society of Arts, a hundred years ago, ask an officer of Engineers to paint the pictures in that room? If Barry had been Barry, R.E., instead of Barry, R.A., would he have been asked to paint these pictures, representing the progress of the arts and sciences? That mysterious council which he had referred to be thought themselves that a Royal Engineer officer was an artist: they were led away by sundry sketches by Captain

Fowke—probably prepared at Woolwich—for turning the National Gallery inside out—and that body fixed upon him. Hence this great national mistake—not, however, a national disgrace. That might be repaired by the speedy demolition of the building after the purposes for which it was unfortunately erected had been served, or else by its conversion to some other useful commercial purpose. He would conclude these few remarks by expressing his admiration of the contents of the Exhibition. His opinion was that the contents of that Exhibition were not a national disgrace, but a national honour, and likely to conduce to the prosperity, the glory, and the honour of England.

Mr. JOHN DILLON rose upon a point of order. On reading the title of the paper he found it to be “On the International Exhibition of 1862.” By the turn which the discussion had taken the most important points of the paper had been left out of consideration, and they had lost sight of the glorious fact that they had called together under one roof all the nations of the earth in this International Exhibition. He therefore thought it would be more becoming to direct some portion of their attention to the contents of the Exhibition, rather than to devote their whole time to the criticism of the building itself.

The CHAIRMAN said, being appealed to, he felt a difficulty in deciding this question, first of all as presiding over a most interesting discussion, and on the other hand being somewhat in the position of a criminal placed on his trial. He could not agree that the able paper of Mr. Hawes precluded all discussion upon the merits or otherwise of the building; at the same time, as lovers of art and harmony, he thought they would desire that the criticisms of the building should not be out of all proportion to the subject, and that the whole time should not be occupied by this one topic; but this was a matter which he thought must be left to the discretion and good feeling of the speakers.

Sir CHARLES FOX begged to state that, with reference to the transept in the building of 1851, Mr. Sala was in error when he stated it was the design of the late Sir Charles Barry. The merit of the introduction of that transept was entirely due to his late respected partner, Mr. Henderson.

The Chevalier DE SCHWARZ (Chief Commissioner for Austria) said, as one of the foreign commissioners, he begged to express his delight at the progress he had witnessed in the present Exhibition, as compared with that of 1851; he believed he expressed the very general opinion of the exhibitors when he stated that the building was in every way suited for its purpose. He did not think it very important if the building did fall short in architectural design. If they were invited into distinguished society, they did not regard the house to which they were invited, but the persons they met there. This was his feeling in the present instance. He hoped that it would be accepted as the general opinion of the foreign exhibitors with regard to the Exhibition building, that it answered in every way the purposes for which it was designed.

Mr. P. L. SIMMONDS regretted that on each occasion of a paper having been read upon the International Exhibition, it should have been made the battle-ground with regard to the building. To return to the subject of the contents of the building, which was more important to those who had sent their contributions, he would only speak for a few moments of that portion over which he had had a considerable amount of superintendence—the colonial department; and he was sure any one who looked upon the progress of those dependencies contrasted with the former occasion, could not but be struck with the immense advances that had been made, not only in manufactures and commerce, but in some of the arts. In 1851 there were but few colonies which took part in the Exhibition. On the present occasion more colonies had taken part than foreign countries; and it was highly creditable to this country that its dependencies had come forward in such a way to show

to the world the progress they had made in their manufactures and in the discovery of those raw materials and other products which were so important to us as a nation. There was another feature, which might be pointed to as satisfactory with regard to our colonies, that was the sums of money which each had voted for the expenses of the exhibition. Many of the larger colonies had voted sums very handsome in proportion to their means, particularly the Australian Colonies. New South Wales had voted £10,000, Victoria £12,000, and the new colony of Queensland had voted between £3,000 and £4,000. Passing from the sums voted to the articles sent, he might state that they consisted principally of the raw materials in which this country was most interested, but they also showed the progress of industry in many important instances. One or two of these must have struck the most superficial observer. The great material of gold could not have escaped observation. The pyramid at one of the entrances showed the amount of gold that had been extracted from Victoria alone—representing a weight of no less than 800 tons. That was not the only auriferous colony in our possession. The gold discoveries in British America had induced a large population to go out there. In addition to the samples of gold obtained from our Australian colonies, there was an exhibition of the quartz crushing machine used in Victoria for obtaining the gold from those rocky deposits. In our North American colonies, the gold discoveries were of great importance; and in British Columbia the indirect as well as direct benefits resulting from the gold discoveries there were most remarkable. Those discoveries might have been productive of some evils in the first instance, but ultimately important benefits were conferred upon the colonies which were gold-producing. In the great staple of wool—second only to that of cotton—this country looked to its colonies for the large supply required for our home consumption; and it must have taken the manufacturers of Manchester by surprise to have found that in such a region as Australia, the most valuable qualities of cotton could be produced; and if that industry could be developed in conjunction with the wools of the sheep and alpaca, together with the valuable furniture and building woods, and—if all the metallic resources of our large colonies were made available for this country, the result could not be otherwise than most important. He thought all who had seen the colonial produce in the present Exhibition must have been struck with admiration of it.

The CHAIRMAN said, although he had the privilege of listening to a great many debates, he had seldom taken a more lively interest in any discussion than in that which had taken place that evening. There was one thing which had more particularly interested him, namely, the suggestions which had been made with regard to the present and future exhibitions; indeed, most of them could have reference only to the preparations for a future Exhibition. He had had the great honour of being intimately connected with the two great Exhibitions which had taken place in this country, and he might say that some of the happiest recollections of his life were associated with the Exhibition of 1851; and having now, under different circumstances, been connected with the management of that in 1862, he had felt the greatest interest, not wholly unmixed with annoyance and trouble, in the conduct of this Exhibition, though he did not look forward to having much connection with another Exhibition, even if he were asked to do so. As some of the suggestions made affected him personally, it might not be uninteresting to the meeting if he stated the impressions which occurred to his mind upon hearing them. First of all, he was relieved when the gentleman who had spoken so much on this subject, in expressing his disapprobation of what had been done, never mixed it with one grain of approbation upon any one single point. He believed the British public were so experienced with regard to grievances and grumbings, that when a speech took that form of

unmitigated censure, it did not produce so much effect upon their ears, and still less upon their minds, as when it was qualified by a certain amount of really judicial criticism. Looking, however, to the prospect of future exhibitions, he did not think some of the suggestions made were such as he should be inclined to recommend. With regard to the taste in which the building had been designed and carried out, he would not advance his opinions on that subject in the presence of such a meeting as this, least of all, in the presence of the gentleman who had addressed them with all the advantages of training as a professional architect, but with regard to one of his suggestions in particular, he (the Chairman) had that English feeling which was in favour of being free and easy in his actions, and he could not conceive a more disagreeable notion than the being "marshalled" with a number of other persons in the vestibule of an exhibition before entering. He did not know what might be the system of military volunteering in the days of the next Exhibition, but he would rather step in at a side entrance than submit to drilling before going in. Then with regard to architectural unity, it did not appear clear that a building composed of different sections, each designed for a different purpose, could possibly possess any architectural unity or beauty of design. Another point on which it was probable there would be greater unanimity was, as to the arrangement of the articles exhibited. For his own part, he had not the slightest doubt of the superiority of the geographical classification over any other. He believed under any other system the difficulties of the management would be increased a hundred-fold. Nothing had given him greater gratification than to witness the liberal, cordial, and conciliatory feeling which had characterised every foreigner with whom he had been brought into contact since their arrival in this country in connection with the business of the Exhibition, but he did not believe that human nature was strong enough, if Russians, Frenchmen, Germans, and Italians, were mixed up together in the building, each accustomed to do business in different ways, to enable them to go on with that harmonious feeling which had hitherto existed. He admitted that, for the jurors or for students, such a classification as Mr. Nelson had recommended would be a saving of trouble, but that was all; for he believed persons in each branch of manufacture could make the comparisons between the productions of each country just as well under the present classification as they could do by having all the articles in one class placed side by side. Although he had travelled a good deal, yet he would say there was something very interesting in finding one's self, when in the Exhibition, suddenly, as it were, in a foreign country—being surrounded by the products of that country—which would not be the case if the articles of each country were distributed in a great many different parts of the building. Mr. Sala, who had spoken very well indeed, and had given them praise and blame in equal proportions, had expressed himself at a loss to understand why the commissioners selected such a building at all; but he thought the beginning of that gentleman's speech furnished the reasons why they did so. He (the Chairman) had not forgotten the experience of 1851. He remembered that eminent men were called upon to give plans, the result of which was that none were considered satisfactory. He never should forget the feeling of pleasure with which he first saw the beautiful design of his excellent friend, Sir Joseph Paxton, which seemed to come so opportunely to relieve the difficulties of the moment, and whilst speaking on this matter, he might remark that there was sometimes great advantage arising from vicissitudes. There was a strong feeling in the public mind that the two noble elm-trees in the park should not be cut down—the British public would not hear of such a thing; and hence that which was at first regarded as an obstacle, had, as Sir Charles Fox had stated, originated the idea of a transept which should enclose the trees.

In comparing the present building with that of 1851, he believed nine people out of ten associated the latter with the beautiful erection now standing at Sydenham, but that was a very different structure, in a great many respects, to the building of 1851. As it was, however, the commissioners found a plan ready prepared. He might say that the late Prince Consort thought most decidedly that the present building was infinitely better adapted for exhibition purposes than that of 1851, and he (Lord Granville) thought it would have been folly on the part of the commissioners to have rejected that plan. He might add that the design was shown to Sir Joseph Paxton before it was finally settled upon, and he expressed his opinion that it was extremely handsome, and well adapted for the purpose. There had been some changes in the design, which had been adopted from motives of economy. That might be a misfortune, but it was a circumstance to which every one was more or less liable from a want of cash. He would now allude for a moment to the suggestions made in the paper, relative to the admission of the working classes to view the Exhibition at reduced rates of charge. He thought that was a question bearing upon the future, and, as such, was one of considerable importance and interest. It was a subject requiring great consideration. First of all they must know what numbers the shilling admission would bring to the Exhibition, because it would not realise Mr. Hawes's views of the greatest happiness to the greatest number, to stuff the largest number of persons possible within a limited space, which they could not extend; and they must remember, after all, whether the admission were a shilling, or sixpence, or twopence, the admission itself bore a very small proportion to the expense incurred by persons coming up from the country to see the Exhibition; and whilst entirely agreeing with Mr. Hawes, that the persons most likely to benefit from the Exhibition were our intelligent artisans, at the same time it would not be conferring a favour upon that class to cram the building with persons inferior to them, so that they would have great difficulty in seeing the objects that were exhibited. While, as bearing upon the question of receipts, the price of admission was most important, still the whole question was one which ought to be looked upon in a large and liberal spirit, and not with mere mercenary motives; but when an enormously expensive undertaking of this sort was carried out by private enterprise, some account must, no doubt, be taken of the receipts. He agreed to the fullest extent as to the advantages to be derived from these Exhibitions—he agreed that their chief value consisted in giving the working classes the fullest possible access to them, but what would be their position if they found the receipts not amounting to one-fifth of the cost of the undertaking, as they had heard had been the case with the Exhibition in Paris? Therefore, he thought in the interests of future Exhibitions, they were bound to look to the question of receipts. With regard to the admirable paper of Mr. Hawes, he could only say he thought, quite agreeing with him as to the advisability of as many of the working classes as possible attending the Exhibition, quite agreeing with him as to the degrees of advantage to be derived by the different classes in visiting the Exhibition—he would, certainly, say for himself, and he believed many would agree with him, that he should go back and study that Exhibition with greater advantage from having heard his judicious, philosophical, and practical remarks upon it. He did not defend the faults of the Commissioners, but however they might dispute about it, the national credit was to a certain degree connected with the success or failure of this Exhibition; and without yielding to any undue bias, he might say that every opinion worth having that he had heard was, that the present Exhibition was in all respects superior to anything that had ever yet taken place in this or any other country; and it was well worthy of this Society, which from the beginning had taken so deep an interest in it, and had borne so active a part in promoting these Exhibitions—

first on a small scale, until under the fostering care and influence of the Prince Consort, they had been brought to the point to which they had now arrived.

Mr. PETER GRAHAM said, as knowing the views of a large number of exhibitors, British and foreign, he begged to state that their opinion was that the building was extremely well adapted to its purpose.

The CHAIRMAN then proposed a vote of thanks to Mr. Hawes, for the paper he had been kind enough to read.

The vote of thanks having been passed,

Mr. HAWES expressed his gratification at the manner in which his paper had been received. With regard to the discussion, he could not but say that he thought nothing more clearly evidenced good taste and sound judgment, than to consult in the highest possible degree the feelings of those present in making any critical remarks, and though, possibly, the present building might be open to criticism, still this might have been put forward in a manner not likely to be offensive to the noble lord in the chair, who had himself taken a most active part in this Exhibition.

The CHAIRMAN assured the meeting that he felt no soreness whatever at the remarks which had been made that evening.

The Secretary announced that this was the last Ordinary Meeting of the Session, and that the Annual General Meeting would be held (in accordance with the bye-laws), on Wednesday, the 25th June, at 4 o'clock p.m.

Home Correspondence.

"A NEW PROJECTILE FORCE."

SIR,—In No. 494 of your *Journal*, there is a long and elaborate paper, by Dr. Meschin, on the above subject. I am not aware whether it is generally known, but in the year 1856 I was engaged in actively experimenting upon the motive power of the explosion caused by a mixture of various gases, with the same objects in view as are mentioned by Dr. Meschin, except as to the gas-gun. I had no idea of applying my ideas in that direction at the time. I may mention that I tried various experiments upon different substances and gases, and in the course of my investigations, determined practically the exact motive power of the explosion of gun-cotton.—(See the *Chemist*.) After taking all the gases practically available, I devoted all my attention to the mixture of air and water gas, or, as I called it, "Hydro-carbonyl." Some of the results I arrived at will help me to a correct criticism of some of Dr. Meschin's suggestions, and I shall be glad to communicate further with any one upon the subject than is warrantable in your valuable paper.

Water could not be economically or practically decomposed into its constituents by frictional electricity. This, no one knowing electricity experimentally, is, I think, prepared to deny; and the same may be said of both thermo-electricity and magneto-electricity. Of course I admit water may be decomposed, but not at a practical cost; so that voltaic electricity alone remains, and the author of the paper must, I feel sure, depend upon that source alone for effective results.

The author, after having described his plan of charging his weapon, proposes firing it by means of several electric sparks. Why sparks should be proposed I cannot conceive, when the voltaic battery that would have to be used for forming the charge would afford the most efficient means of igniting the mixed gases by a fine wire.

After long and continuous labour, I found that a narrow strip of platinum plate may be used for a very long time to fire the gases, being fixed to the metal at one end of its length, and insulated to a wire at the other—the wire being in connection with the battery. By merely touching

the metal of the machine or gun, with the other pole wire, instant ignition is invariably the result.

The author seems to calculate upon the mechanical effect of the recoil in an ingenious contrivance for charging with shot, &c.; but he should remember that the recoil will not be the same in "accelerated velocity" firing as in ordinary.

I agree with the principle of long bore and accelerated velocity in theory, but in practice I think guns should be as light as possible, to save carriage, and the increased length would add to the weight; and I think that it would be found necessary to have the same strength along the whole length of the bore that was filled by the gases in the charge, instead of the greatest strength being at the breech and the rest comparatively lighter.

The author states, correctly, that gunpowder gives at first an increasing force, and afterwards a diminishing force. This is perfectly true; but does the latter operate before the ball leaves the gun, or afterwards?

I think it a pity, too, that upon a subject of such importance the author should be content to say, "if the *Encyclopædia Metropolitana* be right." Surely it would be more conclusive if he had accurately ascertained if the book were right or not. Altogether the scheme is a web of suppositions, many of the suggestions being very excellent, but still not based, as far as I can see, upon any experimental discoveries or foundations.

The author states that a ton of zinc will evolve 1,966 cubic feet of the gases, under a pressure of 10 atmospheres. I cannot agree with this calculation at all. I make the quantity of mixed gases evolved by zinc equivalent for equivalent—equal to (in round numbers) 630 lbs. of water—10 cubic feet. Now, as hydrogen is about 12,000 times lighter than water, and oxygen 750 times, I find that a ton of zinc, or 2,240 lbs., will evolve nearly 2,000 cubic feet of mixed gases, at a pressure of 60 lbs.; or, as he states, 1,966 is somewhere near the quantity, but I must protest against such reasonings when the gases are to be evolved by the battery. This calculation holds good as to hydrogen, when zinc is dissolved in diluted acid; but certainly not when the two gases are collected at the electrodes of the battery, as proposed. There is a great quantity and density of voltaic electricity required to decompose even highly acidulated (and, therefore, more easily conducting) water; and many cells are required to enable the electricity to pass through the liquid at all, and in each cell hydrogen is evolved and zinc consumed theoretically in the same quantity and relative proportion as in the electrode vessel. All these cells would furnish hydrogen, but not oxygen. Certainly a contrivance could be arranged to collect the whole of this hydrogen, and to supply oxygen, chemically, to meet its requirements for combination; but I think there is no one prepared to say he is confident in the practical success of such a scheme at present, whatever voltaic electricity may do hereafter. Again, has the author considered the carriage in warlike times of a liquid like sulphuric acid? This, I know, is not an insurmountable objection, but it is still an evil that there is not now.

The author states that the force impressed upon the projectile might be increased *ad libitum*, and that when the charge of gunpowder is largely augmented, part is blown away unaltered. I can conceive a plan of igniting any sized charge of gunpowder without wasting a grain by igniting the portion nearest the shot by voltaic electricity from a very small series of cells. And if the charge of gases were very largely increased, the length of the gun would have to be increased, or it must be made stronger, which would be a great evil.

Certainly I cannot understand why there should be no report when firing mixed gases; has Dr. Meschin ever fired a soap bubble of the gases and found no report? True, there would be a vacuum almost instantly produced after the explosion, and I have found on a very large scale, with a cylinder of 7 inches diameter and 2 feet long, that when

the piston is heavily laden, the vacuum succeeds the explosion so rapidly that no outward force is produced at all, but always a report. Has Dr. Meschin a Cavendish glass or an eudiometer, or has he ever seen one experimented with? If so, he will remember observing on the small scale what I observed on the large. I am aware that this would be partly obviated by the shot being already in motion, and near the muzzle at the time of explosion, but has the author allowed for the cooling effect of so large a surface of cold metal as the bore of a cannon upon such a minute quantity of vapour of water as is expressed by his term of dew?

I hardly think he is quite plain upon another point. If the gases are to be used at a very high pressure, what will prevent the ball leaving its place during the entry of the charge of explosive mixture? So that

1st. It is doubtful whether the projectile force would be much cheaper than gunpowder; for the author sets out upon a calculation of a wrong basis, and afterwards, in summing up, omits the very item of cost of zinc, upon which his calculation of cost is based.

2nd. The carriage of vitriol and other requisite fluids would be equally, or more, liable to damage than gunpowder, and more dangerous in carriage.

3rd. There would be difficulties to be met in increasing the charge greatly; and the author has not, apparently, taken all sides of this question under consideration.

4th. To be answered below.

The other items have some erroneous ideas conveyed in them, but I will leave them at present. The author asserts that a heavy fly-wheel would prevent the loss of *vis viva* which might attend the suddenness of the application of the force produced by the explosion of the gases. This I deny. The explosion produces an effect instantaneously, similar to a blow from a hammer, but not of sufficient continuity to assist the fly-wheel materially, as before the mass could have acquired any of the force, it would be checked by the perfect vacuum.

The cost would be too great; for experiments have been made largely to enable the decomposition of acidulated water by zinc, to furnish hydrogen under pressure sufficient to obtain motive power, but always without success, the cost of materials being greater than the cost of steam. For the power obtained by voltaic electricity, the cost is increased, as only a small quantity of gases are evolved at the electrodes, for a large number of cells in each of which a similar and equivalent quantity of zinc is consumed.

To avoid the suddenness of this explosion and the rapidity of its succeeding vacuum, I conceived the idea of mixing a neutral gas with the active mixture, which, becoming heated, I thought would, being a bad conductor, prevent the instantaneous succession of the vacuum, and I therefore tried air in place of oxygen, and carbonic oxide, mixed with the hydrogen, or water gas, so that carbonic acid and nitrogen remained as gases after the explosion took place, but I found that a certain charge produced no effect whatever on the piston if loaded, and if not, the same charge would carry the whole piston-rod, &c., away, and this with very little difference in the weight of the piston. I got my engine to work certainly, but in a little while the cylinder became so hot that less charge was required, and the vacuum not so perfect, and, at last, the whole machine burst. My friend, Mr. W. H. Perkin, suggested a modification of my engine, viz., the passing a small quantity of steam over a cylinder of coke kept red hot, and then driving the engine with these gases, and burning them to heat the cylinder and boiler after passing through the cylinder. But we could not at the time devise any method of keeping the coke sufficiently hot in a vessel capable of withstanding the pressure requisite to constitute an available force, and since then other matters have drawn my attention into other channels.

Trusting you will excuse so long a communication,

which is, after all, only a hurried and cursory glance at some of the author's ideas,

I am, &c.,
JOHN G. BLOCKEY.

Hyde-park, Leeds.

P.S.—It might assist the author in his calculations to be reminded that if the hydrogen from every cell of the battery were collected, and the resulting sulphate of zinc treated by Deville's method for oxygen, that still larger quantities might be obtained of the mixed gases. The sulphurous acid too is valuable in stationary situations; indeed, fresh acid could be got from it to re-charge the batteries.

RECREATION IN MECHANICS' INSTITUTIONS.

SIR,—I have read with much interest the thoroughly practical remarks of Mr. Blake in last week's *Journal*, and I beg to give a few words of confirmation derived from some experience among the Institutions of the Midland Counties.

During last winter a most successful series of popular concerts and readings was given on Saturday evenings, in the Wolverhampton Corn Exchange. The payments were 4d. and 2d., and the hall was invariably crowded with attentive and appreciative artisans. Their amateur entertainments were much valued by the public generally, and, in a financial point of view, resulted in a gain of nearly £200, which the Committee purpose to apply to the establishment of some Institution for the people.

In the neighbouring town of Bilston, a place regarded by many as the blackest of all black spots, both in its physical and moral aspects, a few zealous men set themselves last winter to provide a means of rational recreation for the masses of the population, who, it was felt, went to gin-palaces and singing saloons, chiefly because no other means existed for obtaining that relaxation which those who labour in the trying atmosphere of furnaces, forges, and coal-mines require. These entertainments were of a more varied character than those at Wolverhampton. Instrumental music from several bands of the town; songs by amateurs; concerted pieces; readings from standard authors; recitations from Shakspeare, &c., and a fair sprinkling of comic matter, made up weekly a programme sufficiently attractive to draw a large audience for eighteen successive Thursday nights. Classes were established for other evenings, and at each social gathering some allusion was made to them, consequently a very large attendance was kept up in the neighbourhood through the winter and spring months. The whole plan has been most successful and encouraging.

But here my list must close. I can single out no more continued attempts at providing rational amusement for the people at large, from among the 100 Institutions lying in and near this manufacturing district. There is a sound, however, of coming attempts, when the long nights reach us again, and I believe many such trials will be made, which will not all be successful, for the simple reason that too many, who contemplate doing something in this matter of popular recreation, will never get beyond the laudable desire to aid in the work—they will never put the "shoulder to the wheel" by making those sacrifices of time and labour without which no lasting results are likely to be obtained. I trust I may be able to write you another year of more success than I dare anticipate, but

"Forward, though I canna see,
I guess an' fear."

I am, &c.,

JOHN JONES.

South Staffordshire Educational Association,
Dudley, May 27th, 1862.

MEETINGS FOR THE ENSUING WEEK.

- MON.....Entomological, 7.
British Architects, 8.
Geologists' Assoc., 7. 1. Mr. Marcus W. T. Scott, "Mine Surveying and Planning, and the Instruments Employed therein." 2. Mr. R. J. S. Guppy, "On the Older Parian Formation at Pointe-a-Pine, Trinidad."
Royal Inst., 2. General Monthly Meeting.

TUES....Photographic, 8.

- Ethnological, 8. 1. Mr. Spencer St. John, "On the Wild Tribes of Borneo." 2. Mr. Wm. Spottiswoode, "On the Wild Tribes of Kurdistan." 3. Dr. Edward Pick, "On the Law of Growth, as discovered by Dr. Lihartzik." 4. "A Short Vocabulary Collected in Australia by Mr. Walcott," communicated by the Duke of Newcastle.
Architectural Museum, South Kensington, 8. Mr. G. G. Scott, R.A., "On the Formation of a National Museum of Architecture as viewed especially in its connection with the Mediæval Styles."
Royal Inst., 4. Rev. G. Butler, "On the Art of the Last Century."

WED....Geological, 8.

THURS...Antiquaries, 8½.

- Linnean, 8. 1. Dr. Hooker, "On the Vegetation of the Cameron Mountains." 2. Dr. Hicks, "On the Coniferoid Filaments and Gonidia of Mosses." 3. Dr. Anderson, "On the Acanthaceæ of Africa, and the adjacent islands."

Chemical, 8.

Royal Society Club, 6.

Royal Inst., 3. Dr. Lyon Playfair, "On the Progress of Chemical Arts."

FRI.....Royal Inst., 8. Professor Tyndall, "On Force."

Archæological Inst., 4.

R. Horticultural Soc., 2.

SAT.....Royal Inst., 3. Prof. Anderson, "On Agricultural Chemistry."

Actuaries, 3. Annual Meeting.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, May 16th, 1862.]

Dated 5th May, 1862.

1340. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in steam generators. (A com.)

1342. B. Cooke, Frithly-house, Anthony, Devonport—An improved construction of implement for cutting turf.

Dated 6th May, 1862.

1344. R. Mills, Bury—Imp. in washing, wringing, drying, and mangling machines.

1348. J. Clarke and J. Richmond, Chilvers Coton, Warwickshire—Imp. in looms for weaving.

1350. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture and production of minium or red lead. (A com.)

1352. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of soda and potash, and of their carbonates. (A com.)

1354. W. Clark, 53, Chancery-lane—Imp. in cylinder printing apparatus. (A com.)

Dated 7th May, 1862.

1358. E. Bourdon, Paris—Imp. in the construction of blowing fans, which improvements are also applicable to centrifugal pumps for raising water and other liquids or gases, or for exhausting the same.

1366. R. A. Brooman, 166, Fleet-street—An improved box and apparatus for containing and igniting matches. (A com.)

1368. J. Combe, Leeds—An improved machine for spreading and drawing into slivers flax, hemp, jute, and other fibrous substances.

1372. D. Marchal and A. C. De Wiart, Brussels—An improved method of preventing the destructive effects of vibration or jar on the permanent way of railways, and on the wheels, axletrees, and other parts of carriages, and the working and other parts of machinery liable to shocks.

Dated 8th May, 1862.

1374. J. Hay, Troon, Ayr, N.B.—Improved arrangements to facilitate the cleaning and repairing of ships' bottoms.

1378. W. Southwood, Kensington—Imp. in machinery for pulverising ores and extracting metals therefrom, part of which is applicable to breaking stones.

1380. P. Tate, Park-terrace, South-street, Kennington—Imp. in smelting furnaces. (A com.)

1384. A. Kinder, 30, Cannon-street—Imp. in the manufacture of sheet metal.

1386. N. Thompson, Birmingham—Imp. in barometers. (A com.)

[From Gazette, May 23rd, 1862.]

Dated 8th February, 1862.

334. J. A. Knight, 4 Symond's-inn, Chancery-lane—Imp. in washing machines. (A com.)

Dated 21st February, 1862.

465. R. Pickin and W. E. Pickin, Birmingham—Imp. in the manufacture of carriage bodies.

Dated 27th March, 1862.

843. J. Haworth, 22, Southampton-street, Bloomsbury—An improved method of conveying telegraphic messages and signals by means of electricity without the intervention of any continuous artificial conductor.

849. W. F. Henson, 15, New Cavendish-street, Portland-place, and H. H. Henson, 13, Parliament-street—Imp. in wicks for candles and lamps.

- Dated 1st April, 1862.*
921. H. Lorenz and T. Vette, Berlin—Imp. in filters.
- Dated 2nd April, 1862.*
934. W. Clark, 53, Chancery-lane—An improved apparatus for manifold writing. (A com.)
- Dated 3rd April, 1862.*
947. J. Lee, Traction Engine Works, Lincoln—Imp. in traction engines and boilers for traction, locomotive, and other purposes.
- Dated 7th April, 1862.*
985. G. Haseltine, 100, Fleet-street—Imp. in lamps especially designed for burning hydro-carbon oils. (A com.)
939. J. Carrington, Queen's-gate Mews, Kensington—Imp. in the form of bricks, and in the arrangement thereof for paving stables and stable yards.
- Dated 8th April, 1862.*
993. H. Levinstein, 2, Pinners court, Old Broad-street—Imp. in lustring silk, and in machineery or apparatus employed therein.
- Dated 11th April, 1862.*
1041. E. H. Carbutt, Bradford—Imp. in pistons.
- Dated 21st April, 1862.*
1152. J. Combe, Belfast—Imp. in machinery for hackling flax and other fibrous substances.
- Dated 22nd April, 1862.*
1169. C. E. Elliott, 5, Aldermanbury Postern—Imp. in the preparation of dried yeast. (A com.)
- Dated 25th April, 1862.*
1209. J. F. Brunet, 21, King William-street, Strand—Imp. in the manufacture of fringes, and in apparatus connected therewith. (A com.)
- Dated 29th April, 1862.*
1252. W. Clark, 53, Chancery-lane—An improved method of preserving animal and vegetable substances. (A com.)
1263. M. Henry, 84, Fleet-street—Imp. in apparatus for aerating liquids, and in fastenings for the said apparatus and for other articles. (A com.)
- Dated 30th April, 1862.*
1268. G. Davies, 1, Serle-street, Lincoln's-inn—An improved electric apparatus applicable to various useful purposes. (A com.)
- Dated 5th May, 1862.*
1328. H. Alliman, Bedford-row—Certain imp. in the construction of locks.
1336. R. Bushby, Little Hampton, Sussex—An improved method of lifting or lightening ships for entering shallow harbours, or docking and other purposes.
1333. P. L. A. T. Sourbé, Condom, France—An improved method of maturing spirits and wines.
- Dated 7th May, 1862.*
1360. Lieut. P. H. Colomb, R.N., H.M. Dockyard, Devonport—Imp. in arrangements and apparatus for signalling.
1362. T. H. Hopwood, Hulme, Manchester—Certain imp. in the means or apparatus to be employed for the purpose of raising sunken vessels or other submerged bodies, and also in the application of a self-acting balance and regulator to the pontoons used therein.
1364. N. Wood, Hetton-hall, Durham, and J. Stockley, Newcastle-on-Tyne—Imp. in apparatus for grinding, smoothing, and polishing plate glass.
1370. J. Haley, Rochester-villa, Battersea—Imp. in armour plates for ships, boats, and batteries.
- Dated 8th May, 1862.*
1382. G. C. Grimes, 8, Wandle-terrace, South-street, Wandsworth—Imp. in the manufacture of cigar lights, splints, matches, and tapers or vestas, and in machinery or apparatus employed therein.
- Dated 9th May, 1862.*
1390. T. K. Mace, Birmingham—Imp. in guards or protectors for hats and other coverings for the head.
1294. T. Fawcett, jun., Lisburn, Ireland—Imp. in plaited fabrics for shirt fronts and other uses, and in the mode of and mechanism for manufacturing the same.
1296. T. Welton, 13, Grafton-street, Fitzroy-square—Imp. in the preparation of beverages in connection with brewing.
1398. Capt. F. J. Bolton, Bolton-row, May Fair—Imp. in telegraphing for naval and military and other purposes, and in the apparatus connected therewith.
- Dated 10th May, 1862.*
1402. J. F. Milward, Redditch—Imp. in breech-loading fire-arms. (A com.)
1404. R. Moore, Cannon-street-west—Improved apparatus for indicating the presence, position, or accumulation of liquids, gases, or vapours, and apparatus for preventing danger or damage consequent thereon.
1406. J. T. Cooke, Leicester—Imp. in battens used in weaving.
1408. H. D. Taylor and E. Robinson, Huddersfield—Imp. in piecedyed woollen fabrics, or fabrics composed of wool in combination with other fibrous substances.
1410. W. H. Ronald, Montrose—Imp. in apparatus for signalling and indicating the position of shots in rifle practice.
1414. H. W. Sambridge, Birmingham—Imp. in sliding chandeliers, gasellers, and other pendant lamps.
- Dated 12th May, 1862.*
1416. J. Milnes, Gloucester—Imp. in portable apparatus for exercising the human body.
1418. W. Clark, 53, Chancery-lane—Imp. in smoke consuming fire-grates. (A com.)
1420. C. J. Harris, 20, King William-street, Charing-cross—Imp. in the manufacture of detector, season, or non-transferable tickets.
1422. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in casting metals, and in the moulds and cores employed therein. (A com.)
1424. H. Cartwright, The Dean Brosely, Shropshire—Imp. in propelling and steering screw steam vessels.
1428. J. L. Wilson, St. John-street, Smithfield—Imp. in calendering woven fabrics, and in the apparatus employed for this purpose.
1430. E. F. Lansky, Nottingham-street, Sheffield—An improved mode of, and apparatus for, working railway carriage brakes.
- Dated 13th May, 1862.*
1432. S. B. Ardrey, Birmingham, and S. Beckett, Oldham—Imp. in machinery or apparatus for manufacturing spindles, part of which apparatus is also applicable to grinding and polishing other articles.
- INVENTION WITH COMPLETE SPECIFICATION FILED.
1490. N. Ames, Saugus, Massachusetts—A new and useful self-feeding card printing press.—16th May, 1862.
1505. E. J. Bridell, Middle Temple—Imp. in the manufacture of substances artificially coloured, veined, or mottled, like marbles or other substances.—17th May, 1862.

PATENTS SEALED.

[From Gazette, May 23rd, 1862.]

2981. F. F. Dumarchey.	3257. W. E. Newton.
2991. W. Clark.	3269. W. H. Bailey.
2995. W. Rowan.	475. G. T. Bousfield.
3002. P. Spence.	667. W. H. Latham, and F. C. W. Latham.
3008. L. H. C. J. Carle.	829. J. T. Loft.
3026. R. A. Rust.	844. W. Greenaway.
3209. W. L. Allchin and W. Allchin.	

[From Gazette, May 27th, 1862.]

2122. H. Nelson, J. Carr, and G. Harrison.	3055. M. Henry.
3019. J. Cooper and C. Garrod.	3057. A. Woodward, R. Woodward, and W. Woodward.
3022. J. Wakenell.	2058. J. Bailey and W. H. Bailey.
3025. T. W. G. Treeby.	3108. W. H. Tooth and W. Yates.
3028. J. H. Glew.	3120. J. D. Jobin.
3030. J. Leach.	3150. E. Cajot.
3032. J. L. Field.	3162. R. Shaw.
3035. W. E. Gedge.	3214. J. H. Johnson.
3042. R. Kennedy and J. Armstrong.	38. J. Corton.
	510. J. Whitworth.
	700. J. Kent.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, May 27th, 1862.]

1240. J. Valda.	1272. N. S. Dodge.
1268. C. P. Moody.	1279. G. D. Jones.
1270. F. J. Bramwell.	1289. R. A. Glass.
1350. G. H. Cottam and H. R. Cottam.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, May 27th, 1862.]

1139. I. J. Silbermann, jun.	1170. J. Park.
May 21st.	May 22nd.
1167. J. A. Longridge.	1195. W. S. Young.
	1199. C. W. Harrison.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4481	May 17.	Rotary Jag for cleaning the barrels of Rifles.	James Aston	School of Musketry, Hythe.
4482	„ 26.	Plough	John Hodgson	29, Newmarket street, Lincolnshire.

Journal of the Society of Arts.

FRIDAY, JUNE 6, 1862.

INTERNATIONAL EXHIBITION OF 1862.

SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £451,800, have been attached to the Deed.

ELEVENTH ANNUAL CONFERENCE.— NOTICE TO LOCAL BOARDS.

The Eleventh Annual Conference between the Representatives of the Institutions in Union and the Council, will be held on Monday, the 23rd inst., at 12 o'clock, noon. Sir Thomas Phillips, Chairman of the Council, will preside.

Secretaries of Institutions in Union are requested to forward, *as soon as possible*, to the Secretary of the Society of Arts, the names of the Representatives appointed to attend the Conference, stating at the same time, if possible, whether those gentlemen will also be present at the Society's Annual Dinner, which will take place on the following day, and of which particulars are given below.

The Chairmen of, or Representatives from, the Local Boards of Examiners are invited to attend.

ANNUAL DINNER.

The One Hundred and Eighth Anniversary Dinner of the Society will take place in the Refreshment Room over the Central Entrance from the International Exhibition Building to the Horticultural Gardens, on Tuesday, the 24th inst., at half-past five for six o'clock punctually. The Right Hon. W. E. Gladstone, M.P., will preside.

Applications for tickets (price fifteen shillings each) should be made after Wednesday, the 11th

inst., to Mr. S. T. Davenport, at the Society's House; and it is particularly requested that those who intend to be present will take their tickets as early as possible in order to facilitate the arrangements.

CONVERSAZIONI.

The second and third Conversazioni of the present season will be held at the South Kensington Museum, on the 9th of July and the 8th of October.

WHAT IS GOOD IRON, AND HOW IS IT TO BE GOT?

The following remarks, bearing upon a very important question, will be found not without interest:—

What is good iron, and how is it to be got? The conviction is daily gaining ground that by the penny-wise and improvident use of inferior qualities of iron much capital has of late years been wasted and much risk incurred. And in such a case it might be thought that to discover the error was all that is needed to amend it. If a brown loaf will not serve the purpose, let those who have money buy a white one, and there is an end of the difficulty. But the analogy does not hold. There is some obstacle in the background which is the more formidable for not being clearly seen or understood. The newspapers tell us of works retarded at the dockyards because the Admiralty cannot get the iron they require, and of "angle bars" rejected and returned on the hands of respectable firms who cannot have wanted the will to satisfy their critical customers. Great railway companies have begun to make their own rails, because they despair of obtaining in any other way the requisite quality. And all this at a time when for four years the price of iron, good as well as bad, has been falling, or in other words the supply has constantly exceeded the demand! How comes it that the prodigious development of the iron trade has led to a state of confusion in which, as it would seem, good iron can neither be bought nor sold? It is the object of this paper to offer an explanation of this paradox.

From the very first the progress of the iron manufacture has shown itself only in the increased facility and diminished cost of production. In the quality of the produce there has been no improvement since, in days anterior to history, a small quantity of iron was extracted from the best ores, which alone were then available, by the rudest and most laborious process.

The great discovery of smelting iron by means of pit-coal effected a change in the manufacture which has assured to England the command of the markets of the world, but has lowered the quality of the iron. There are purposes which iron thus smelted will not serve, and accordingly a small quantity of iron smelted, as of old, with charcoal, is still made in this country, and further supplies are imported from Sweden.

In our own days the introduction of the "hot blast" has brought about a second revolution in the manufacture hardly less important than the first in its results, but unfortunately qualified with a larger alloy of evil. Between thirty and forty years ago it was discovered that by heating to a very high temperature the "blast" which maintains the combustion of the smelting furnace a great saving in the quantity of fuel might be effected. This led to the further discovery that not only might the coal be used in its raw state, by which the expense and the loss of coking were saved, but that coal which had hitherto been rejected for its noxious qualities might now be sent to the furnace; and subsequently by the same means even the intractable anthracite was pressed into the

iron master's service. Hitherto only the superior argillaceous ores of the midland districts could be profitably converted into iron; but by the application of the hot-blast the metal was extracted from every substance that contained it. The "black band," which had resisted all attempts to make it productive, became a mine of wealth to its possessors; and as the minerals of the Cleveland, Northamptonshire, and other districts were successively discovered, they were converted into cheap and serviceable although inferior iron. It was also found (and of all the benefits of the hot-blast this is the most questionable) that the cinder or refuse of the puddling forge, hitherto of no value, would, when added to the materials of the hot-blast furnace, yield a large percentage of iron (though of very inferior quality), and thus increase the bulk though it damaged the character of the produce. The pig-iron thus made is always designated in the trade as "cinder-iron."

Pig-iron, as most readers are aware, is the name given to the thick coarse-looking bars into which the molten metal is formed in moulds of sand as it runs from the furnace. It is the raw material of all the subsequent operations of the manufacture, and on its quality the quality of all that is made from it depends. The changes which the metal undergoes in the various processes to which it is subjected are so important that the three forms in which it is best known to the public—pig-iron, wrought iron, and steel—are virtually distinct metals; yet the two first are both indiscriminately called "iron," when the context is supposed to make it clear which is meant; and this loose nomenclature is apt to occasion some confusion to those who are applying themselves to the subject for the first time.

The annually increasing quantity of cheap pig-iron thus thrown into the market compelled the iron masters who possessed the best minerals and the best fuel to reduce by every expedient their own cost of production; and gradually the pressure of competition induced them to employ the hot-blast to a considerable extent.* Where they have done this without unduly lowering the quality of the materials, the "hot-blast iron" so produced bears a very high character; but, unfortunately, many of them have availed themselves of the hot-blast to bring into use any materials which would enable them to compete in price with the makers of the cheapest iron, and thus the name of the district has ceased to be of itself a sufficient guarantee for the quality of its produce.

The application of this new agency to so many new materials had the effect of sending into the market, not only an increased quantity of iron, but a variety of quality such as hitherto had been unknown. At the head of the list stands the grey cold-blast iron. By untoward accident, or by want of care or skill, the produce of the cold-blast furnace may turn out mottled or white, and is then of inferior value. But the grey cold-blast iron by its name gives a guarantee for the quality of its materials, and is therefore divided by a strong line of demarcation from all "hot-blast" whatever; nevertheless, the difference between the cold-blast and the best "hot-blast" made from the clay ironstones without any admixture of cinder is small in comparison with that which separates the best hot-blast from the worst. It might fill a volume to describe the various properties and uses of the various kinds of iron. It is sufficient to note that only two kinds, the cold-blast and the best hot-blast, will bear repeated "working" without losing their fibrous texture. These are not matters of opinion or bare assertions, to be received with caution. It is manifest that if the cheaper kinds of iron were not inferior in quality to the more costly, the cheapest would long ago have driven all others out of the market. The "price-lists" published from time to time show pretty accurately the estimation in which the produce of the different materials and modes of manufacture

is held by the trade; and undoubtedly this variety of quality in pig-iron and latitude of choice would be an unmixed benefit, if all manufacturers were perfectly honest and all their customers absolutely wise.*

The increased supply of cheaper iron was, in fact, needed for the development of modern civilisation, and in the first instance produced unqualified good. For many purposes inferior iron was found to answer as well as the best. A kitchen poker need not have the strength of a battering-ram, and iron was now applied to uses for which formerly it would have been thought as reasonable to employ the precious metals. At this time it requires an effort of memory to recollect how very recent is the application of iron to fencing and various other agricultural and domestic purposes, for which it is now used as a matter of course.

But throughout the history of the iron manufacture, good and ill are inseparably interwoven. The efforts to discover the cheapest iron that would just serve the purpose, often degenerated into the use of iron that would just not serve the purpose—that served it to the eye, but not to the hope—ending in such imprudent applications of it as cannot be made without the most serious risk to human life. The subject is too familiar to most readers to need much illustration. The following instances present in strong contrast the different results of true and false economy.

In a conversation which took place in the house of Commons on the recall of Sir Baldwin Walker, Lord Clarence Paget is reported to have stated that the cylinders of the *Himalaya* were defective; and a few days subsequently the papers informed us that they "were to be renewed." The *Himalaya* has been afloat at most but a few years. On the other hand there is to be seen in an old iron-work in the midland district (and this is only one of many similar instances) a 94-inch blowing cylinder made in the days of good iron (it is marked "Bersham, 1801"), which has been in constant use night and day for fifty-five years, and is still perfectly sound and fit for service.

When rails were first manufactured for the newly projected lines, they were made of a quality which might in some degree be expected to bear the friction and the momentum of the prodigious masses which were to be whirled over them. But the cost of such rails was considerable; their merit was not discernible by the eye. Directors were ignorant, engineers inexperienced. The present was all important, and competition was hot. Inferior iron, and, worst of all, cinder-iron (the nature of which has been already explained) was employed almost of necessity, and all but universally. The consequence is, that the greater part of the lines need relaying, years before such an expenditure ought to be required. Nor does the mischief stop here. What is to become of the prodigious mass of old rails? If the railway Boards work them up again (and the temptation is all but irresistible), they only repeat the error; or if a portion of these rails is sold as "scrap-iron," who is sanguine enough to hope that it will be purchased only for those purposes to which inferior iron can fitly be applied? There is no escaping from the consequences of the first fault, and these cinder-rails will long be bandied about to burden the market and infect the manufacture of the country.

It is to the credit of the railway companies and the mechanical engineers that they have from the first seen the importance of making the boilers for the locomotive engines as strong as the best material could make them; and accordingly scarcely an accident is recorded which can be attributed to a failure in the quality of the boiler-plates.

In the same spirit, when iron merchant-vessels first came into use, their plates were made of the tough fibrous iron used for ordinary boiler-plates, and the result corresponded

* In many instances the exhaustion of the best materials has made this necessary.

* 'Quarterly Review,' No. 217; vide an article on the Iron Manufacture, which contains a compendious account of its progress.

with the prudence of the design. The *Great Britain*, stranded in Dundrum Bay, withstood for months the beating of a surf such as no floating work of man's hands had ever stood before, or ever will stand again, till ship-builders change their present short-sighted policy. The success of the first iron boats was complete. Their cost was amply repaid by their durability and the cheapness of their repairs. "But could they not be made for less?" asked the Spirit of Gain. "No doubt they could," answered Competition. Other plates of inferior construction, to which the distinguishing name of "boat-plate" was given, were forthwith manufactured. A "boat-plate" may be had for from 20s. to 30s. per ton less than a "boiler-plate." The saving thus effected in so large an expenditure is trifling, the difference in security and durability is very great. Six Baltic steamers belonging to the port of Hull have been lost in scarcely more than a twelvemonth. How many more of these cheap iron vessels have left our shores and have never since been heard of! and how often must these mysterious disappearances be multiplied, before our shipowners are convinced of their mistake! It is understood that the under-writers have taken up the subject. The increased rate of insurance on cheaply-built iron boats will give some measure of the additional risk occasioned by this ill-judged parsimony, and may perhaps weigh with those, if any such there be, to whom higher motives appeal in vain.

But although in this and similar cases it is natural to inveigh against the avarice and inhumanity which incur such risks, it is more just to attribute the error to ignorance and divided responsibility, and to the whirl of competition, which does not leave the time for thought, and scarcely even—as conscience would fain persuade herself—the liberty of choice. The ship-owner has no notion how much the reduction of the price diminishes the strength of the plates; the manufacturer knows nothing of the forces which the plates should be calculated to resist. Both may be humane and sensible men, but between the two the ship, the cargo, and the crew are lost. Competition is the vital principle of progress in the arts and manufactures, but like all other strong incentives to human action, it produces evil in large proportion to the good. Cheapness is a most legitimate object of pursuit, but it is rightly pursued so long only as there is a distinct understanding between the buyer and the seller as to the effects of cheapness upon quality. Practically, such an understanding rarely exists. The public insists upon cheapness, and chooses to ignore the conditions on which alone cheapness can be obtained. The manufacturer is tempted or obliged to follow the impulse given by the public, and in furnishing a bad article pacifies his conscience by the reflection that "it is good enough for the money;" and further, when the public carries its exigency to the point of demanding impossibilities, impossibilities are promptly and unscrupulously performed. The detriment which over-eager competition causes to the commerce of the world and to its morality is incalculable, but in all this the short-sighted public plays the part of the tempter, and must be content to take its share of the blame. And there is yet worse behind. The public having encouraged the production of a cheap and worthless article, has no security for obtaining a good one even when willing to pay its price. There are tricks in all trades; and assuredly the iron-trade forms no exception. The iron-master, who requires confidence and a liberal order with fraud and a bad article, commits a folly which must in the first instance recoil on himself, but which in its consequences affects the innocent. Such instances, it is to be hoped, are rare, but a very few will do irreparable mischief. Hence arises the general distrust which is a prominent cause of the present confusion in the iron-trade; and hence it is that, among those who are ignorant of the facts, there gets abroad a vague and confused notion, compounded of indolence and disappointment, that either good iron is no longer to be had, or that good iron after all differs little from bad.

And what is the condition of the market and manufacture of iron which has resulted from the introduction of this new and powerful agency, the hot-blast?

It is obvious that the steadily increasing supply of an article for which the demand fluctuates with every vicissitude by which the general commerce of the country is affected, must occasion great variations in the price. The periods of depression which for many years past have recurred at uncertain intervals are often spoken of as "capricious" and "unintelligible;" that is to say, their causes are so complicated and obscure, that nothing relating to them can be predicted or explained with certainty even by those most interested in observing closely. But the one cause, which is necessary to their existence is *over-production*.

Throughout all these fluctuations, as might be anticipated, there is to be traced a steady decline of price. In 1806, according to tables published at Liverpool, "merchant bars" (finished iron) made from cold-blast pig-iron (for none other was then known) were quoted at £17 10s., per ton. In 1861 the best make of Staffordshire had sunk to £7 10s., and Welsh bars might have been bought for even less than £5 15s. It is true the present is a time of unusual depression, but if we take the average price which finished iron must maintain, if it is to remain a staple manufacture of the country (about £8 per ton), even thus the reduction is prodigious; and if cheapness were the only measure of progress, the advance would be great indeed.

With regard to the manufacture, printed returns give us the following facts:—

In the year 1840 the total make of Great Britain is stated at what was then thought the marvellous amount of 1,396,000 tons. In 1860 it had risen to 4,155,000 tons, and to such an extent has the productive power of the country increased, that to this prodigious total another million might, on any sudden demand, be added without any additional expenditure on buildings or machinery, or "plant," as such previous preparations are technically termed. It must also be noted that great skill has been acquired in the art of correcting the defects of the inferior kinds of iron by judicious mixtures, and thus giving them the highest quality of which they are susceptible. But these brilliant results are qualified by a fearful drawback. In the year 1840 the cold blast iron amounted to 771,000 tons, or considerably more than half the whole make. In 1860 it is a significant fact that the distinction between hot and cold blast is no longer noted in the returns; but of the aggregate make of 4,166,000 tons it is not possible to estimate the portion of cold blast at more than the odd 156,000 tons. Those best acquainted with the trade agree that in the year 1860 there could scarcely have been more than thirty furnaces blown with cold blast, and that the annual production of each of these cannot be rated at so high an average as 5,000 tons. Perfect accuracy cannot be attained, as perpetual changes are taking place in the ironmasters' arrangements, and little is known of the production of those pig-iron manufacturers who consume at their own forges the produce of their furnaces. But this calculation is sufficiently near the truth to justify the assertion that, while in twenty years the total make of the country has been trebled, the cold-blast has dwindled down to one-fifth of its former amount; and whereas in 1840 it constituted considerably more than one-half of the aggregate produce of the iron manufacture, in 1860 it sunk down to about one twenty-ninth. Assuredly if there was not a great redundancy of cold-blast pig-iron in the year 1840, there must have been a great deficiency of it in the year 1860.

But every ironmaster knows that in the year 1840 there was no wasteful employment of cold-blast iron. Even then complaints of its scarcity were to be heard, and since that time the need for the best iron has increased, and many new uses for it have been invented. Let any man practically acquainted with the requirements of the

various branches of the iron-manufacture make his estimate of the probable demand for first-class pig-iron, and then compare it with the supply; or let us suppose some commission of ironmasters possessed of the despotic power with which the captain of a ship, in time of scarcity, regulates the short allowance, and empowered to dole out to each manufacture the supply of cold-blast iron supposed to be indispensable to its operations; such a tribunal would find that the disproportion between the estimated demand and the possible supply was enormous: nor would the difference between the estimated and the actual demand be less striking; and the divergency of practice from theory thus indicated is a subject of very grave anxiety.

For some time past a vague dissatisfaction with the state of the iron trade—an uneasy consciousness of something wrong—has perplexed the public mind; and now, when, by the employment of iron as the principal means of warlike defence, the iron manufacture has been invested with a political and national interest, a desire is generally felt to bring it back to a sounder state. But it is easier to lose the right way than to find it again. It is the opinion of men best acquainted with the trade, that neither the present make of cold-blast iron, nor even that of the best hot-blast, could be very suddenly or very greatly increased. It is fortunate that among the numerous works which the pressure of the times has closed, very few of those making superior qualities of iron are included. If a large and steady demand for good iron were to arise, the manufacturers of pig-iron would have a motive for retracing their steps as far as is still possible; and in the districts where the best materials are to be found, quality rather than cheapness would again be their aim. Where the materials are partially exhausted, the deficiency might, to some extent (thanks to the increased facilities of traffic) be supplied from other districts. And although no great and strongly-marked change is possible, it may be hoped that the aggregate of many small augmentations to the quantity of first-class iron might swell to a larger total than is generally supposed possible. But till the demand for the best pig-iron occurs, the iron-master cannot be expected to stir, and as yet there are many causes to prevent its occurrence. The old traditions of the iron trade are lost. Thirty years wear out more than one generation of working-men. The great maxim—that the best article can be made only from the best materials—that is to say, the best pig-iron from the best minerals, and the best wrought iron from the best pig-iron—might, indeed, seem too simple and too important to be forgotten, and too obvious to need much argument for its re-establishment. But practically it has fallen into disuse, and powerful interests are arrayed against it. Whole districts have for years been actively engaged in the struggle to make inferior iron supply the place of good, and motives of interest and self-love combine to induce the belief that it really will serve as well. We are not referring to recent ingenious inventions for removing impurities from inferior kinds of iron, by special processes and at an increase of expense, but simply to the substitution of iron that will indifferently answer the purpose for iron that will answer it effectually. Men of great practical skill have been reared up in the business, who nevertheless have had little experience of the best iron, and are indisposed to admit its necessity. As the iron manufacture extends, and its operations become more varied, the knowledge required by the manufacturer is at once more extensive and more minute, and more difficult of attainment. The reader unacquainted with the iron-trade must be told that pig-iron is classified according as it is more or less grey, and consequently better adapted for the foundry or for the forge. But in no two districts does the classification exactly agree, and in no two works even is the iron of precisely the same character and quality. Moreover, by the exhaustion of the materials, or a change of operations, changes in the quality of the produce are constantly occurring which are not in-

dicated by any corresponding change of name; and often under the same names are classed things of very different value. Thus, for instance, the hard and the unctuous hæmatite ores differ from each other materially in quality; yet the iron made from each is comprehended under the common name of "hæmatite;" and numberless similar facts might be added to show how exact is the knowledge that is needed of the market and its changes. But while the craft of the wrought-iron manufacturer is daily becoming more difficult, it more frequently happens that men are drawn into the iron-trade who had no previous knowledge of its details, and are obliged to trust to a manager for the general conduct of the business, and to a broker for a supply of the proper pig-iron. The manager is often biased by local prejudices, the broker is imperfectly acquainted with his principal's requirements. When the broker turns iron-merchant, there is no doubt his speculations in a time of depression lighten its severity to the producers of iron, but his interest is no longer in exact accordance with those of his employer, or, as he now becomes, his customer. When prices are low there is no room for the profits of a middleman, and his efforts to make one cause an additional complication in the confusion of the market.

In the midst of all this perplexity one object only—price—is clearly discerned by the manufacturer. As to the qualities of iron and its uses, he is puzzled by the most conflicting opinions and the most contradictory statements. Truth flies from him, even if he is quite sincere in seeking it. But the saving of so much per ton in the pig-iron, which is his raw material, is a palpable fact, about which there can be no mistake. The very skill which has been attained in making the most of the inferior kinds of iron by mixing and manipulation contributes to mislead him. He trusts to it for more than it can effect, and not unfrequently spends more in the vain effort to turn bad iron into good than it would have cost him to purchase the right material at first.

(To be continued.)

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The thirty-second meeting will commence on Wednesday, the 1st of October, 1862, under the direction of the following officers:—President, Rev. R. Willis, M.A., F.R.S., Jacksonian Professor of Natural and Experimental Philosophy in the University of Cambridge. Vice-Presidents—The Very Rev. Harvey Goodwin, D.D., Dean of Ely; the Rev. W. Whewell, D.D., F.R.S., Master of Trinity College, Cambridge; the Rev. A. Sedgwick, M.A., D.C.L., F.R.S., Woodwardian Professor of Geology in the University of Cambridge; G. B. Airy, Esq., M.A., D.C.L., F.R.S., Astronomer Royal; J. C. Adams, Esq., M.A., D.C.L., F.R.S., Pres. C.P.S., Lowndean Professor of Astronomy and Geometry in the University of Cambridge; G. G. Stokes, Esq., M.A., D.C.L., Sec. R.S., Lucasian Professor of Mathematics in the University of Cambridge. General Secretary—William Hopkins, Esq., M.A., LL.D., F.R.S., F.G.S., Cambridge. Assistant General Secretary—John Phillips, Esq., M.A., LL.D., F.R.S., F.G.S., Professor of Geology in the University of Oxford, Oxford. General Treasurer—William Spottiswoode, Esq., M.A., F.R.S., F.G.S., F.R.A.S., &c., 19, Chester-street, Belgrave-square, London, S.W. Local Secretaries for the meeting at Cambridge—Charles C. Babington, Esq., M.A., F.R.S., F.L.S., Professor of Botany in the University of Cambridge. G. D. Liveing, Esq., M.A., Professor of Chemistry in the University of Cambridge. The Rev. N. M. Ferrers, M.A., Gonville and Caius College. Local Treasurer for the meeting at Cambridge—The Rev. W. M. Campion, M.A., Queen's College.

The general committee will meet on Wednesday, the 1st of October, at 1 p.m., for the election of sectional

officers, and the despatch of business usually brought before that body. On this occasion there will be presented the report of the council, embodying their proceedings during the past year. The general committee will meet afterwards by adjournment.

The first general meeting will be held on Wednesday, the 1st of October, at 8 p.m., when the President will deliver an address; the concluding meeting on Wednesday the 8th of October, at 3 p.m., when the Association will be adjourned to its next place of meeting.

At two evening meetings, which will take place at 8 p.m., discourses on certain branches of science will be delivered.

There will also be other evening meetings, at which opportunity will be afforded for general conversation among the members.

The Committee of Sections will meet daily, from Thursday, the 2nd of October, to Wednesday, the 8th of October inclusive, at 10 a.m. precisely.

The Sections will meet daily, from Thursday, the 2nd of October, to Tuesday, the 7th of October, inclusive, at 11 a.m. precisely.

Reports on the Progress of Science, and of Researches entrusted to individuals and committees, and other communications intended for presentation to the sections, are expected to be forwarded in letters addressed to the Assistant General Secretary, at Cambridge, previously to the meeting, accompanied by a statement whether the author will be present, and on what day, so that the business of the sections may be satisfactorily arranged.

The Reports complete, and concise Abstracts of other communications, are to be delivered to the Secretaries of the Sections before which they are read, previously to the close of the meeting, for publication in the Transactions. As the Reports on Science may be more interesting to more Sections than the one which originally called for them, it is desirable that the authors should be prepared to furnish the means of reading them in any other section at the request of the President and Secretaries of that Section.

The following are the titles of the sections to which communications may be presented:—Section A. Mathematics and Physics. B. Chemistry and Mineralogy, including their applications to Agriculture and the Arts. C. Geology. D. Zoology and Botany, including Physiology. Sub-Section D. E. Geography and Ethnology. F. Economic Science and Statistics. G. Mechanical Science.

Members will receive their tickets in the Reception Room according to their Class of Membership, separate registers being appointed for Old Life Members, Old Annual Subscribers, New Annual Subscribers and Associates.

Gentlemen desirous of attending the Meeting will find in the reception room blank forms of proposal, and may make their choice of being proposed as life members, paying ten pounds as a composition, or annual subscribers paying one pound annually and an admission fee of one pound (making together two pounds on admission), or associates for the meeting, paying one pound.

Ladies may obtain tickets, through the application of a member, in the reception room, price one pound each ticket. These tickets are transferable to other ladies only.

Compositions, subscriptions and arrears are received during the meeting in the reception room, and at all times by the Local and General Treasurers.

K.G.; Vice-Presidents—the Right Hon. the Lord Mayor; His Excellency M. Van de Weyer; Earl Granville, K.G., Chancellor of the University of London; the Lord Bishop of London; Major-General Sabine, President of the Royal Society; General Secretary and Chairman of the Executive Committee—George W. Hastings, Esq.; Finance Secretary—Andrew Edgar, Esq.; Foreign Secretary—George Whitley, M.D.; Secretary to the Executive Committee—J. H. Randall, Esq.

The following is the programme of arrangements:—
MEMBERS.—Any person (lady or gentleman) becomes a member on payment of one guinea, and receives a ticket of admission to all the meeting and soirées. Every member is also entitled to a volume of the Transactions for the year.

Ladies may join the association as members, as above; or they may obtain, on payment of a half-a-guinea, a ticket of admission to the meetings and soirées.

Societies and other public bodies may become corporate members on payment of two guineas, and are entitled to send three delegates to the meetings and soirées and to receive a volume of the Transactions for the year.

The Guildhall, with the Courts adjoining, has been placed at the disposal of the Association by the Lord Mayor and Corporation of the City. Her Majesty's Judges have consented to arrange the *Nisi Prius* sittings during Trinity term so as to leave the Courts free for the week of the meeting. All the Departments will therefore meet in the morning of each day at Guildhall.

The use of the west wing of Burlington-house has been granted by the Royal Society and the University of London. The Philanthropic Congress will hold its morning sittings in the Hall; and that room, and the ante-room, will be used by the Association for its Evening Discussions.

The Palace at Westminster has been granted by the First Commissioner of Public Works and the Commissioners of Woods and Forests, for a Soirée on the evening of Saturday, the 7th of June.

The opening meeting of the Association will be held on the evening of Thursday, June 5th, at 8.30 p.m., in Exeter-hall. The President will deliver his address, and other distinguished persons will take part in the proceedings.

The meetings of the Departments will be held, from Friday the 6th to Friday the 13th, both inclusive, at the Guildhall, from 11 a.m. to 4 p.m.

The meetings of the Congress will be held on Monday, June 9th, and following days, at 11 a.m., in Burlington-house.

Evening Discussions, on subjects of special interest, will be held at Burlington-house, at 8.30 p.m., on Friday the 6th, Monday the 9th, Tuesday the 10th, and, if convenient, on other evenings.

The Royal College of Physicians will receive the Officers and Council of the association, and the leading foreign members, at a soirée, on the evening of Monday, the 9th of June.

The Reformatory and Refuge Union will give a soirée to the members and ladies of the Association and Congress, at the Hanover-square Rooms, on the evening of Tuesday, the 10th of June.

The proceedings of the week are:—

Thursday, June 5th—Opening meeting of the Association, in Exeter Hall, at 8.30 p.m. The President delivered his address.

Friday, June 6th—The departments meet in Guildhall, at 11 a.m., for the reading of papers and Discussion. Evening Discussions at Burlington-house, at 8.30 p.m.

Saturday, June 7th—The Departments meet in Guildhall, at 11 a.m. Soirée at the Palace of Westminster at 9 p.m.

Monday, June 9th—The Departments meet in Guildhall, at 11 a.m. The Congress will meet in Burlington-house at 11 a.m.; the President will deliver his address.

NATIONAL ASSOCIATION FOR THE PROMOTION OF SOCIAL SCIENCE, AND INTERNATIONAL PHILANTHROPIC CONGRESS.

The Sixth Annual Meeting, held in London, 1862, commenced yesterday, and will last till the 14th inst.

The following are the officers for the present year:—President—the Right Hon. Lord Brougham; President of the Congress—the Right Hon. the Earl of Shaftesbury,

Evening Discussions at Burlington-house, at 8.30 p.m. Soirée at the Royal College of Physicians.

Tuesday, June 10th.—The Departments will meet in Guildhall, at 11 a.m. Annual Meeting of the Ladies' Sanitary Association, in the Public Health Department, at 2 p.m.; the Lord Mayor in the chair. The Congress will meet in Burlington-house, at 11 a.m. Evening Discussions in Burlington-house, at 8.30 p.m. Soirée at the Hanover-square Rooms, by the Reformatory and Refuge Union.

Wednesday, June 11th.—The Departments will meet in Guildhall, at 11 a.m. The Congress will meet in Burlington-house, at 11 a.m. Evening Discussions at Burlington-house, at 8.30 p.m.

Thursday, June 12.—The Departments will meet in Guildhall, at 11 a.m. The Congress will meet in Burlington-house, at 11 a.m. Evening Discussions at Burlington-house, at 8.30 p.m.

Friday, June 13th.—The Departments will meet in Guildhall, at 11 a.m. The Congress will meet in Burlington-house, at 11 a.m. Concluding Meeting of the Association in Burlington-house, at 8.30 p.m.

Saturday, June 14th.—Dinner at the Crystal Palace, Sydenham.

For the purpose of receiving personal communications, the Executive Committee sit at 3 o'clock, at the Office,

12, Old Bond street, W., on Mondays, Wednesday, Fridays, and Saturdays; and at the same hour at the City Office, Guildhall, E.C., on Tuesdays and Thursdays.

All communications concerning papers or other business of the meeting, must be addressed to the Executive Committee, 12, Old Bond-street, W.

The following are the Officers and Committee of the Congress:—Secretaries—Thomas Twining, Esq.; James T. Hammack, Esq. Committee of Organisation—Henry Roberts, Esq., F.S.A., Chairman; W. Farr, M.D., F.R.S.; James T. Hammack, Esq.; Major-General Sir Joshua Jebb, K.C.B.; Samuel Redgrave, Esq.; John Simon, Esq., F.R.S.; and Thomas Twining, Esq.

The regulations concerning papers are as follows:—

Every paper must be sent to the Executive Committee. On the first page of every paper must be written the subject, the name of the author, and his address. The Council reserve the right of rejecting any paper which they consider inappropriate. No paper must occupy in reading more than twenty minutes. No paper already published can be read. No paper, when read, can be published by the author (unless by permission of the Council) previous to the publication of the Transactions of the Association for 1862. The Council may print any paper, either in whole, or in part, or may exclude it from the Transactions, as they see fit.

THE WEAR OF SILVER COINS.*

The following Statement shows the results of some Experiments made upon a large number of Silver Coins, by Mr. William Miller, first Assistant-Cashier of the Bank of England. Of these 169,000 were examined singly, with the view of ascertaining the present condition of the Silver Circulation, and the loss by year. It should be remembered that the average loss by wear in a century, given in the Table, is founded upon the wear which the several coinages have undergone up to the present time; but as the rate at which a coin wears is an increasing rate, it is obvious that the actual loss in a century would be much greater than that here given:—

	Amount Coined since 1816.	Withdrawn from Circulation.	Remaining in Circulation.	Average of Loss by wear in 100 years at the rate at which the Coinage of the several reigns have worn, up to the present time.	Loss by wear on Amount withdrawn.	Loss by wear on Amount in Circulation.	Number of Coins examined singly.
	£	£	£	Per Centage.	£	£	
CROWNS	VICTORIA.....	117,414	...	117,414	5.50	...	4,000
	WILLIAM IV..	...	...	...	...
	GEORGE IV...	140,726	...	140,726	7.04		
	GEORGE III...	321,750	...	321,750	7.46		
HALF-CROWNS.	VICTORIA.....	1,043,251	...	1,043,251	14.17	13,546	20,000
	WILLIAM IV..	380,556	...	380,556	15.30		
	GEORGE IV...	1,113,848	...	1,113,848	15.80		
	GEORGE III...	2,387,088	252,870	2,134,218	15.92		
FLORINS	VICTORIA.....	1,541,161	...	1,541,161	15.	...	5,000
SHILLINGS	VICTORIA.....	2,609,504	490	2,609,014	26.55	167,684	80,000
	WILLIAM IV..	412,038	49,944	362,094	26.82		
	GEORGE IV...	878,922	350,622	528,300	28.74		
	GEORGE III...	3,304,224	867,674	2,436,550	29.96		
SIXPENCES	VICTORIA.....	1,182,339	298	1,182,041	37.	72,420	60,000
	WILLIAM IV..	281,994	34,614	247,380	39.		
	GEORGE IV...	81,378	47,738	33,640	44.8		
	GEORGE III...	919,314	312,250	607,064	45.		
		16,715,507	1,916,500	14,799,007		253,650	
						910,617	
						253,650	
						1,164,267	{ Total loss by wear.

(Signed)

W. MILLER,

Bank of England, December, 1860.

* See also *Journal*, Vol. viii., p. 739.

ROLLER SKIDS FOR BOATS.

There are doubtless few persons that reside on, or have visited our coasts, who have not frequently watched with interest the picturesque groups of fishermen and other boatmen hauling up their boats, and observed the contrivances by which that often laborious operation is made more easy of accomplishment—varying according to the size of the boat, the character of the beach, or mere local custom.

At one place—as at Deal or Hastings, with their steep shingle beaches, large boats, and numerous bodies of boatmen—will be seen the long row of powerful capstans, by the aid of which the large decked or half-decked smack, hovelling boat, or trawler, is hauled up with comparative ease, yet seemingly reluctant to leave her native element, in which her weight is nothing, and in which she lives and moves, to hibernate, as it were, for a time with suspended life and animation, motionless on the land. There, also, it will have been observed that long flat boards of hard wood, with their upper surface greased, are placed under the boats when hauling up or launching, so as to reduce as much as possible the friction as they are dragged along.

At another place, as at Great Yarmouth or Lowestoft, with a flatter and sandy shore, their long and graceful

yawls and smaller craft are, for the most part, hauled up by hand alone, the numerous boatmen being banded together in companies, and mutually assisting each other in the operation. Here the friction of hauling up is lessened by employing small portable machines, consisting of a strong wooden frame with two or three iron rollers fixed in it, which is traversed by the boat's keel, she being held in an upright position by men at her sides.

Again, farther north, on the still flatter sands of Northumberland, Durham, and Yorkshire, where the three-keeled and graceful coble abounds, the fishermen, often aided by their wives and daughters, will be seen lifting them on the little wooden trucks, on which they are wheeled along on the hard and level strand.

Annexed are wood cuts of the “roller-skids” used by the Norfolk and Suffolk boatmen in hauling up their larger boats, and which have been adopted by the National Life-boat Institution, and found valuable auxiliaries in hauling up its life-boats, saving much labour, trouble, and expense. There are three varieties of these skids used by the life-boats of the Institution—one is the simple wooden frame with either two or three rollers in it (Fig. 1), which is sufficient on hard ground, moveable short boards being placed under it transversely where the beach is soft. A second (Fig. 2) is similar, but having its sleepers attached

FIG. 1.

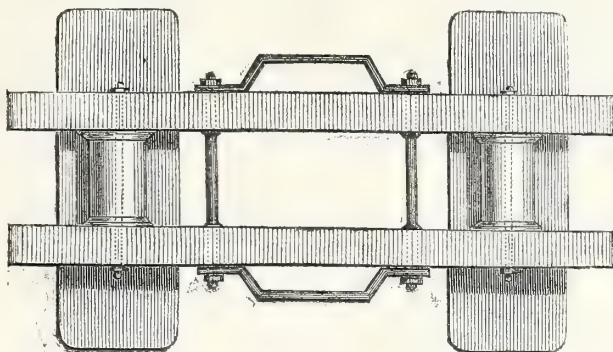


FIG. 2.

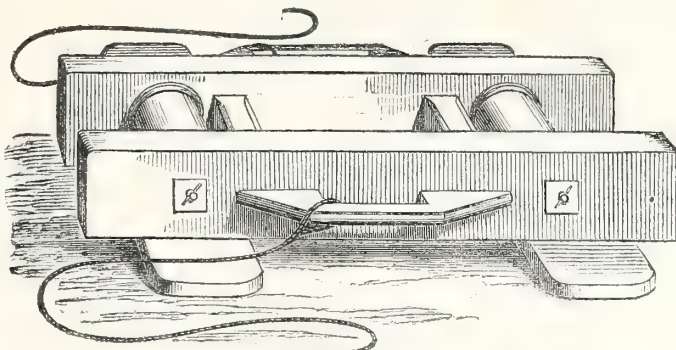
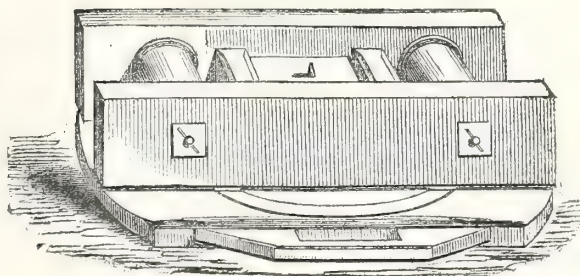


FIG. 3.



to it beneath the rollers, which form is most convenient for placing under a boat whilst she is still in the water. Much labour is saved by hauling a heavy boat on the rollers whilst she is still partly water-borne, and it is awkward to place a detached board under a skid in the water, especially when the boat has much motion from the surf. A skid of this description can, by means of two short lines attached to it, as shown in the figure, be readily hauled under the stem or sternpost of a boat by two men or lads, one dragging by each line. These lines should be of Manila rope, which will float, and thus indicate the position of the skid when under water. Two-inch rope will be found a convenient size.

A third variety (Fig. 3) is a shorter skid, similar to the above, fitted to turn on a pivot-bolt fixed in a flat piece of wood, thus forming a portable turn-table, on which a boat, when hauled over it, can be turned round with very small power in any direction. The life-boats of the Institution are supplied with one of these turntables, with two of the second variety, or water-skids, for use in the water, and with two of the plain skips with detached sleepers. A less number would, however, be sufficient for ordinary use, unless for very large and heavy boats; and they are strongly recommended to the attention of the boatmen on those parts of the coast where they are not already employed.

During the past two years (1860-61), the National Life-boat Institution has incurred expenses amounting to £22,650 on various life-boat establishments on the coasts of England, Scotland, and Ireland. In the same period the life-boats of the Institution have been instrumental in rescuing 500 persons from different shipwrecks on the coasts of the United Kingdom. For these and other life-boat services, the Institution has voted £1,893 as rewards to the crews of the life-boats. It has also granted rewards amounting to £515 10s. for saving 373 shipwrecked persons by shore-boats and other means, making a total of 871 persons saved from a watery grave during the last two years. The number of lives saved by the life-boats of the Society and other means since its formation, is 12,293, for which services 82 gold medals, 704 silver medals, and £15,250 in cash have been paid in rewards. The Institution has also expended £57,200 on life-boats, life-boat transporting carriages, and boat houses. The public cannot but sympathise with the vigorous efforts now being made by this Institution to save the lives of shipwrecked crews. Their help was never more needed than at the present time, when, through the extraordinary exertions the Society has made within the past few years, it has now one hundred and twenty-one life-boats under its management, for the maintenance of which, in a state of thorough efficiency, a large permanent annual income is absolutely needed, if its humane mission is to be perpetuated. Contributions are received for the National Life-boat Institution by all the bankers in the United Kingdom, and by the Secretary, Richard Lewis, Esq., 14, John-street, Adelphi, W.C.

INDURATION OF STONE.

Mr. Frederic Ransome, of Ipswich, who has patented several processes for the production of artificial stone and for the preservation of natural stones liable to premature decay, has recently discovered a new and simple process, by which it is stated that some of the commonest and most abundant natural materials may be combined and formed into solid blocks of masonry, or moulded into works of art, at a cost comparatively trifling.

The peculiarity of Mr. Ransome's process for preserving stone consists in the production within the pores of the stone itself of silicate of lime—a substance which possesses the most enduring properties. He has hitherto accomplished the induration by first saturating the stone with a solution of the silicate of soda (soluble glass), and by afterwards applying a solution of chloride of calcium (muriate of lime). Here double de-

composition takes place, the silica combining with the calcium to form a solid silicate of lime, and the chlorine at the same time combining with the soda, forming chloride of sodium or common salt, which is removed by subsequent washings or otherwise. It was in noticing the enormous cohesive properties exhibited by the silicate of lime thus produced that Mr. Ransome was led to investigate the applicability of that material as an essential ingredient in the manufacture of stone itself, and the results of his experiments have been patented. The new process consists in mixing common sand, chalk, or other suitable mineral substances with a solution of silicate of soda into such a consistence that the mixture can be easily moulded into blocks or any other forms, rolled into sheets or slabs, or applied with a trowel as ordinary cement. Afterwards a solution of calcium is applied by means of a brush or by immersion, as may be most convenient. The patentee states that the effect is instantaneous, the material being immediately converted from a soft soluble substance into a hard insoluble compound, capable of resisting the influences of the most deleterious atmospheres, and possessing the property of gradually increasing in hardness with the lapse of time.

Amongst the advantages of this process it may be mentioned that the stone can in most cases be manufactured upon the spot, from materials obtained in the locality; that it can be moulded into any form or made in masses of any dimensions; that it is equally available for ornamental and decorative as for constructive purposes. It requires no artificial drying or burning, while it is in no way liable to shrinkage or distortion of any kind. It exhibits all the characteristic features and appearance of the best freestone, and can be produced of any desired tone of colour.

Dr. Edward Frankland, who was appointed by the Government to investigate the causes of decay of the new Houses of Parliament, says, speaking of the tests to which Mr. Ransome's new stone has been subjected:—

"The chief object of these experiments was to expose the samples to influences similar to those to which the stones themselves would be subjected, when used for outside work in our large cities; but in order as far as possible to arrive, within a moderate time, at results which under ordinary circumstances would only be obtained after the lapse of many years, it was necessary to intensify those influences by presenting the various chemical re-agents to the stone more continuously, and in a more concentrated form than would be the case in the ordinary atmospheric degradation to which building stones are exposed."

"The experiments were made in the following manner:—The samples were cut as nearly as possible of the same size and shape, and were well brushed with a hard brush. Each sample was then thoroughly dried at 212°, weighed, partially immersed in water until saturated, and again weighed; the porosity or absorptive power of the stone was thus determined. It was then suspended for forty-eight hours in a very large volume of each of the following acid solutions, the alteration in weight after each immersion being separately estimated. Solution No. 1, water containing 1 per cent. sulphuric acid; solution No. 2, water containing 2 per cent. sulphuric acid; solution No. 3, water containing 4 per cent. sulphuric acid. The sample was then boiled with water until all acid was removed, and again weighed. Finally, it was dried at 212°, brushed with a hard brush, and the total degradation or loss since the first brushing was ascertained."

There was no loss with 2 per cent. or with 4 per cent. of dilute acid, and only the fractional portion of a single part, as shown in the total of degradation from all causes.

The comparisons in Dr. Frankland's table of experiments, whilst they point out the Portland, Whitby, Hare Hill, and Park Spring, as the natural stones best adapted to withstand the influences of town atmospheres, indicate Ransome's patent concrete as equal to the best of these in its power of resisting atmospheric degradation; and the newness of Ransome's stone (the specimens experimented

upon not having been made a fortnight) being taken into account, together with the fact that its binding material, silicate of lime, becomes harder and more crystalline by age, having led Dr. Frankland to express the opinion that it is likely "Mr. Ransome has invented a material which, with the exception of the granites and primary rocks, is

Name of Stone.	Porosity percentage of water absorbed by dry stone.	Percentage Alteration in Weight by Immersion in dilute Acid.						Total percentage loss by action of acid and subsequent boiling in water.	Further loss by brushing.	Total degradation from all causes.
		Of 1 per cent.		Of 2 per cent.		Of 4 per cent.				
		Loss.	Gain.	Loss.	Gain.	Loss.	Gain.			
Bath.....	11.57	1.28	—	2.82	—	2.05	—	5.91	.26	6.17
Caen	9.86	2.13	—	4.80	—	.67	—	11.73	1.60	13.33
Aubigny	4.15	1.18	—	4.00	—	—	1.04	3.56	.29	3.85
Portland	8.86	1.60	—	1.10	—	1.35	—	3.94	.24	4.18
Anston.....	6.09	3.52	—	3.39	—	3.11	—	11.11	.27	11.38
Whitby	8.41	1.07	—	—	.53	none.	none.	1.25	.18	1.43
Hare Hill	4.31	.75	—	—	.60	none.	none.	.98	.15	1.13
Park Spring	4.15	.71	—	—	.10	15	—	.81	none.	.81
Ransome's Patent ...	6.53	—	.95	none.	none.	none.	none.	.63	.31	.94

better capable of giving permanency to external architectural decorations than any stone that has been hitherto used."

Mr. Ransome it still engaged in further experiments with this artificial stone, as to its powers to support a crushing weight, and to sustain strains under varying conditions.

Proceedings of Institutions.

HASTINGS MECHANICS' INSTITUTION.—The report laid before the annual meeting, held May 7th, says:—"The lecture session just concluded is the most important feature of this year's operations. The following is a list of the lectures delivered:—"Remains of Extinct Animals," B. W. Hawkins, Esq.; "Literary Reading," R. Butler, Esq.; "School of Nature," Dr. Moore; "The Moon," Rev. T. Harding; "Poets in Action," J. Saunders, Esq.; "The Honey Bee," Dr. Hale; "The Poetry of Wordsworth," Rev. R. W. Jones; "Daniel Defoe," G. Dawson, Esq.; "Trade of Israel on the Red Sea," S. Sharpe, Esq.; "Washington and his Times," W. D. Lucas-Shadwell, Esq.; "Julius Cæsar," Mr. T. Edwards; "Oxy-Hydrogen Microscope," J. Kilburn, Esq.; "Napoleon the First," E. Harcourt, Esq.; "Useful Plants," Mr. W. King; "The Arctic Regions," J. G. Fitch, Esq.; "George Stephenson," Mrs. Balfour; "Comets," Rev. T. Harding; "The Pulpit, the Bar, and the Press," Rev. J. C. Fishbourne. The Committee regret to state that the serious illness of F. North, Esq., M.P., prevented him from favouring the members with a promised lecture on "Republics; Ancient, and Modern." The Committee feel much indebted to the gentlemen who so readily gave their time and talents for the benefit of the Institution. The lectures were all well attended. The receipts of the lectures were £14 18s. 9d., and the expenditure £30 10s. 6d., so that the average cost of each lecture was 17s. 1d. During the past quarter the number of persons elected members was 9, and the number who declined 63; the present number is 312. During the whole year 137 have joined the Institution, and 151 have left. During the past quarter 653 books have been in circulation. The volumes issued during the year have been 2,050. The Committee feel some doubt as to whether it would be advisable to subscribe to some London library, so as to procure a constant supply of new books. After giving the question due consideration, they have decided that it would be better to spend any surplus funds they may have at their disposal in additions to the library, rather than adopt such course. They have thus been enabled to purchase 33 volumes of new books, which are eagerly sought after by the members. The reading-room is well supplied with daily and weekly

papers and periodicals, and is much frequented by the members. The income for the past year was £191 18s. 8d., and the expenditure £181 8s. 1d. The Institution begins the year with not a debt unpaid. The subject of classes is one that the Committee cannot report upon as favourably as they could wish. The partition for forming the class-room is perfect in its workings, but students are not forthcoming to fill the classes. Mons. Petitfour, at the commencement of the session, offered to take charge of a French class, and the class was formed, but in a few weeks it was discontinued for the want of members. It is a source of deep regret that the young men amongst the members should not appreciate the first-class instruction they would receive in the study of a language that is now so much spoken. A class for English grammar has been carried on through the winter under Mr. T. Edwards; and although the Superintendent was very energetic, and used every means in his power to induce young men to join, but two or three met each evening. A writing class has met on Wednesday evenings, under the superintendence of Mr. Avery, but the average attendance at that class has been no more than five. An arithmetic class, conducted by Mr. F. Womersley, has met on Thursday evenings; the average attendance at this class has been four. The superintendents of these classes, however, report that, although the attendance is small, the progress made by the students is satisfactory; and that the superintendents are not discouraged, but will, with the return of autumn, have great pleasure in being as useful as they can to the Institution. A discussion having arisen at the last quarterly meeting, as to the advisability of subscribing to the National Fund for erecting a Monument to the late Prince Consort, a motion was carried recommending the Committee to prepare subscription-lists for the members. The Committee duly considered the recommendation, but a Local Memorial Fund being then about to be raised, they thought it would not be just to interfere with that effort, especially as it appeared probable that the members of the Institution would subscribe to the Local Fund in preference to forwarding their subscriptions to the Society of Arts for the National Memorial. The Committee also felt that they should not like to see the Hastings Institution represented by a small amount; on these grounds they decided to let the matter rest. In concluding the report the Committee congratulate the members on the continued prosperity of the Institution.

ROYSTON INSTITUTE.—The last report states that the Committee regret that, during the past year, they experienced great difficulties, which compelled them in the latter portion of the year to abstain from all but absolutely necessary expenses; and they rejoice to report that by exercising a sound economy they can now show a more favourable result at the close of the year than they at one time anticipated. It is difficult to account for any decline in the

support given to the Institute. Until the past quarter (when the number of members was increasing through the attraction of the classes) the members subscribing to the reading-room were considerably less than in 1860. Possibly the attractions of the reading-room were not so great through the cheapness of newspapers, which are now within the reach of the poorest member of society. The total expenditure last year was £54 19s.; this sum added to the debt at the commencement of the year, gives a total of £62 19s. 3½d.; but the income was only £61 17s. 9½d., still leaving a deficiency of £1 1s. 6d. The members and subscribers of 1861 were:—32 life members, 2 honorary members, 140 ordinary members, 52 admitted to the lectures by means of family tickets, 2 subscribers for the lectures only, and 14 for the reading-room alone—total 242, being one less than in the previous year. The total sum subscribed, however, was about £5 less. Of the ordinary members 65 belonged to the class of mechanics, domestic servants, and young persons—an increase of 2 on the previous year. Eight lectures and entertainments were given during the year, to which free admission was granted:—On “George Stephenson” (gratuitous), Rev. E. Wrenford; “Charlotte Brontë,” Mrs. Balfour; “A Musical Entertainment,” Mr. and Mrs. Cooper; “Human Hand” (gratuitous), Dr. Humphry, of Cambridge; “Acoustics,” Mr. Wheeler; “The Earth’s Magnetism and the Sun’s Spots,” Mr. Hunt; “Africa” (two, gratuitous), Rev. W. Monk. The members were also admitted at half-price to an “Oration” by Mr. Langdon Davies. The meeting for competitive trials of skill in the games of chess and draughts was presided over by the Rev. H. W. Hodgson, of Ashwell. Fourteen volumes of books were purchased and added to the library, through the liberality of Joseph Beldam, Esq. Members making use of the library were 97; evenings for issuing books, 52; volumes issued, 1,933; volumes renewed, 669—total number of volumes, 2,602—average each evening, 50. Ninety members subscribed to the reading-room during the year. The classes formed last October have been highly successful. The Committee feel deeply indebted to the Rev. R. Shaen and Mr. Isaac Beale for their liberality in conducting them.

MEETINGS FOR THE ENSUING WEEK.

- MON.....R. Geographical, 8½.
 TUES.....Medical and Chirurgical, 8½.
 Zoological, 9.
 Syro-Egyptian, 7½. Rev. Basil H. Cooper, “On the Dated Greek *Proscynemata*, found in Egypt; with especial reference to a hitherto unobserved phenomenon relating to them.”
 Royal Inst., 4. Rev. C. Butler, “On the Art of the Last Century.”
 WED.....Microscopical, 8.
 Literary Fund, 3.
 Royal Soc. of Literature, 8½.
 Archæological Assoc., 8½.
 THURS...Philological, 8.
 Royal Inst., 3. Dr. Lyon Playfair, “On the Progress of Chemical Arts (1851-1862).”
 FRI.....Astronomical, 8.
 Royal Inst., 8. Sir Henry Rawlinson, “On Cuneiform Writing and the way to read it.”
 SAT.....Royal Botanic, 3½.
 Royal Inst., 3. Dr. T. Anderson, “On Agricultural Chemistry.”

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 7th May, 1862.

- Par
Numb.
 206. Postal Service (Kingstown)—Returns.
 161. Cadastral Survey—Report from Committee.

SESSION 1861.

- 324 (A xi.) Poor Rates and Pauperism—Return (A).

Delivered on 8th May, 1862.

167. Civil Contingencies—Account.
 194. Lunatics—Return.

197. Fire Engines, etc. (Bills of Mortality)—Return.
 201. Game Laws, etc. and Game Laws—Returns.
 208. Army (Effectives)—Return.
 211. Railway and Canal Bills Committee—Sixth Report.
 205. Agricultural Statistics—Return.
 100. Bill—Public Works and Harbours Act Amendment.

Delivered on 9th May, 1862.

188. Cunard Mail Steamers—Returns.
 191. Registry of Deeds Office (Dublin)—Return.
 207. Sugar Duties—Return.
 98. Bills—Merchandise Marks (as amended by the Select Committee.)
 101. Bills—Transfer of Land.
 102. „ Declaration of Title.
 103. „ Security of Purchasers.
 104. „ Real Property (Title of Purchasers).
 United States (Political Arrests)—Extract of a Despatch.

Delivered on 10th and 12th May, 1862.

140. Post Office Savings Banks—Account of Deposits, etc.
 203. Post Office Savings Banks—Returns.
 217. Merchant Seamen’s Fund—Account.
 221. Fires in the Metropolis—Report from Committee.
 105. Bill—Landed Property Improvement (Ireland) Acts Amendment.
 Rebellion in China, and Trade in the Yang-Tze-Kiang River—Papers.

Delivered on 13th May, 1862.

183. Mines—Return.
 225. Poor Relief (Lancashire, etc.)—Return.
 Births, Deaths, and Marriages in England—Twenty third Annual Report of the Registrar General.

Delivered on 14th May, 1862.

209. Canada (Halifax, etc. Railway)—Copy of Memorials.
 216. East India (Army)—Return.
 218. Seamen’s Savings Banks—Account.
 219. Mercantile Marine Fund—Account.
 222. Education Grants—Correspondence.
 223. County Treasurers (Ireland)—Account.
 224. Lanely, etc. Schools—Correspondence.
 202. Landed Estates Court (Ireland)—Returns (a corrected Copy).
 106. Bills—Peace Preservation (Ireland).
 107. „ Poor Law Officers’ Superannuations (Ireland).
 108. „ British Museum.
 109. „ Customs and Inland Revenue (amended).
 110. „ Discharged Prisoners’ Aid.
 112. „ Retiring Pay, etc. British Forces (India).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, May 23rd, 1862.]

Dated 13th May, 1862.

1436. J. B. Sardy, London—Imp. in the construction of ships of war and other vessels.
 1438. A. Wormull, Old Fish street—Imp. in trepanning instruments.
 1440. J. H. Johnson, 47, Lincoln’s inn-fields—Imp. in the purification of colza, rape, and other oils. (A com.)
 1442. J. Sirewright, Ravenhead, St. Helen’s, Lancashire—Imp. in the manufacture of polished plate glass.
 1446. R. A. Brooman, 166, Fleet-street—Imp. in louvre blinds or shutters. (A com.)

Dated 14th May, 1862.

1450. C. T. Porter, 100, Fleet-street—Imp. in steam-engine indicators. (A com.)
 1452. F. Tolhausen, 100, Fleet-street—Imp. in the manufacture of velvets. (A com.)
 1456. A. Smith, Mauchline, N.B.—Imp. in balances for weighing letters and other documents.
 1458. H. G. Delvigne, 26, Rue St. Dominique, Paris—Imp. in fire arms.
 1460. J. C. Brant, 69, Forston-street, City-road-basin—Imp. in the construction of armour-plated ships, and in cements or compositions for uniting iron to iron, and for uniting other substances, which compositions may also be used for caulking and for coating ships’ bottoms.

Dated 15th May, 1862.

1462. J. Fletcher and J. W. Fuller, Salford—Imp. in machinery for rolling, bending, and planing metals.
 1464. G. H. Sanborn, 100, Fleet-street—Imp. in machinery for spinning. (A com.)
 1466. J. P. Jouvin, Rochefort-sur-Mer, France—An improved process for preserving iron-plated and other vessels and metallic articles from oxidation, and preventing ships’ bottoms from fouling.
 1468. W. Sissons, Kingston-upon-Hull—Imp. in machinery for driving piles by means of steam hammers.
 1470. J. Stone, High-street, Deptford—Imp. in Downton’s ship bilge pump and fire engines.
 1472. J. Wright, 42, Bridge-street, Blackfriars—Imp. in machinery for digging, excavating, and removing earth, gravel, and such like substances. (A com.)
 1474. C. Tress, Blackfriars-road—Imp. in the manufacture of hats, helmets, bonnets, or caps.

[From Gazette, May 30th, 1862.]

Dated 8th April, 1862.

1001. H. A. Holden, Birmingham, and C. Weekes, Carmarthen—Imp. in apparatus used in drawing water or other fluids from cisterns, tanks, or other vessels.

Dated 16th April, 1862.

1110. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for cutting the teeth of wheels, racks, or segments. (A com.)

Dated 19th April, 1862.

1143. W. Munn and D. Ballentine, jun., Borrowstounness, Linlithgow, N.B.—Imp. in mills for grinding.

Dated 21st April, 1862.

1163. A. Dixon, Birmingham—Imp. in knife and fork cleaning machines.

Dated 23rd April, 1862.

1187. A. V. Newton, 66, Chancery-lane—Imp. in looms for manufacturing tufted pile fabrics, and in the mode of operating such looms. (A com.)

Dated 25th April, 1862.

1211. P. R. Drummond, Perth, N.B.—A revolving rake for lifting objects from the ground.

Dated 30th April, 1862.

1264. E. Moore, Tewkesbury—Imp. in the manufacture of dress shirts and dresses.

1265. A. Travis and B. Travis, Dukinfield—Imp. in engines for carding cotton and other fibrous materials.

1267. J. Harrington and T. Perkins, Birmingham—An imp. or imps. in mounting photographic portraits for visiting cards, and in mounting photographs in general.

1269. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in the manufacture of nails, screws, and other analogous articles in malleable cast iron. (A com.)

1271. J. Maiden, Waterloo, near Ashton-under-Lyne—Imp. in safety lamps.

1273. T. Piatti, 76, Rue St. Louis au Batignolles, Paris—Imp. in the propulsion of ships and other vessels, and in the means and apparatus employed for this purpose.

1275. J. Oxley, Garden-street, Sheffield—Imp. in apparatus for cutting and chopping bread and other substances.

1277. J. M. Carter, Monmouth—Imp. in harness and the shafts of carriages.

1270. W. Staufen, George-street, Portman-square—A new material to be used in the manufacture of brushes, and also applicable to the purposes for which bristles, horse hair, and human hair are now used.

1281. J. M. Napier, York-road, Lambeth—Imp. in machinery for manufacturing projectiles.

1283. H. F. Broadwood, Great Pulteney-street—Imp. in the construction of pianofortes.

1285. W. E. Newton, 66, Chancery-lane—Imp. in lamps. (A com.)

Dated 1st May, 1862.

1287. J. Swallow and J. Allinson, Heckmondwike—Imp. in the manufacture of carpet fabric.

1289. C. P. A. Douchain, St. Cloud, France—Imp. in apparatus for letting in or shutting off water or other liquids.

Dated 2nd May, 1862.

1291. W. Huntingdon and T. Huntingdon, Victoria Mills, Liverpool—Imp. in the machinery for the manufacture of bread.

1292. H. Kohn, 29, Unter den Linden, Berlin—A new method of making any kind of stuffs, textures, or fabrics waterproof.

1293. W. Bodden and W. Mercer, Oldham—Imp. in certain parts of machinery for slubbing and roving cotton and other fibrous substances.

1295. R. Walker, Glasgow—Imp. in malting, and in apparatus therefor.

1297. O. C. Evans, 20, Church-street, Old Kent-road—An abdominal truss intended for the more perfect support and cure of hernia.

1301. M. Paul Dumbarton—Imp. in windlasses and capstans, or ship's winding apparatus.

1303. H. Welch, Millwall—Imp. in securing or attaching armour plates on or to ships or vessels.

Dated 3rd May, 1862.

1305. W. Mossman, 1, Cleveland-terrace, Gloucester-road, Islington—Imp. in the manufacture of bonnets, hats, or coverings for the head.

1309. E. Omerod and C. Schiele, Manchester—Imp. in machinery or apparatus for cutting or dressing stones, which are also applicable for hammering, crushing, or otherwise reducing metals and other materials.

1311. J. M. Herdevin and J. A. Julien, 13, Rue Gaillon, Paris—Imp. in sluice cocks.

1313. J. M. Heppel, 34, Great George-street, Westminster—Imp. in the construction of the permanent way of railways.

1315. W. Black, Wood-street, Northampton—Imp. in lottery or ballot boxes.

1317. M. Henry, 84, Fleet-street—Imp. in the process of and apparatus for preparing materials for the manufacture of paper, and in obtaining products from agents used in the said process, part of the invention being also applicable to apparatus for washing. (A com.)

1319. S. Merolla, Lago Castello, No. 75, Naples—Imp. in fire-arms.

1321. J. Mellodew and T. Mellodew, Moorside Mills, Oldham, and C. W. Kesselmeier, Manchester—Imp. in looms for weaving.

1323. J. Heyworth, Shawforth, near Rochdale—Imp. in looms for weaving.

Dated 5th May, 1862.

1325. A. Williams, New Windsor—The construction of a backed form or seat capable of being converted into a level table with seat or a desk either level or sloping or at any angle.

1327. L. G. Perreux, Paris—Certain imp. in clocks or machines for keeping time.

1331. T. F. R. Brindley, 2, Leonard-square, Finsbury—Imp. in travelling and other flasks, decanters, bottles, and other necked vessels.

1334. J. Victor, Wadebridge, J. Polglase, Bodmin, and W. Roundsevell, St. Breck, near Wadebridge, Cornwall—Imp. in the manufacture of safety fuses for mining and other purposes.

1335. R. Burley, Glasgow—Improved arrangements for using ordnance under water, and in part applicable otherwise.

1337. J. Roscoe, Bell-lane, Leicester—An improved lubricator for steam engines.

1339. E. B. Wilson, 5, Parliament-street, Westminster—An imp. in the machinery or apparatus used in the manufacture of malleable iron and steel.

1341. J. Adcock, Marlborough-road, Dalston—Improved apparatus for measuring and indicating distances travelled by wheel carriages.

Dated 6th May, 1862.

1343. T. Cabourg, 333, Rue St. Martin, Paris—Imp. in machines for the purpose of uniting together by means of screws leather used in the manufacture of boots and shoes, and other articles composed of two or more pieces of leather.

1345. A. Morel, Roubaix, France—Imp. in heckling machines.

1346. G. Borthwick, Bedford, near Leigh, Lancashire—Certain imp. in the construction of ships, boats, and rafts.

1347. P. Chenailleur, Paris—Imp. in apparatus for concentrating liquids, or for condensing alcoholic or other vapours.

1349. W. Richard and J. Richard, Edinburgh—Imp. in the manufacture of printing types, spaces, and quadrats.

1351. W. Greaves, 11, Portland-street, Poland-street, Soho—Imp. in safety stirrup bars.

1353. W. Clark, 53, Chancery-lane—An improved buckle or fastening. (A com.)

1355. J. E. Ransome, W. Copping, and L. Lansdell, Ipswich—Imp. in harrows.

Dated 7th May, 1862.

1356. W. E. Nethersole, Swansea—Imp. in parts of railway trucks and waggons, swans of which are applicable to railway carriages.

1359. C. V. F. De Berville, 72, Rue Blanche, Paris—An improved safety coupling bar for locomotives and other railway carriages.

1363. C. Clark, 361, City-road—An improved cigar tube.

1365. J. Johnson and A. Chapman, Leatherhead, Surrey—Imp. in apparatus for preventing collisions on railways.

1367. R. A. Brooman, 166, Fleet-street—Imp. in swings. (A com.)

1369. G. T. Bousfield, Loughborough-park, Brixton—Imp. in applying steam power to tilling land by means of a digging locomotive. (A com.)

1371. W. Gossage, Widness, Lancashire—Certain improved apparatus to be used in the manufacture of soap.

1373. J. McCann, Dublin—Imp. in the mode of, and apparatus for, drying, cooling, and cleaning grain.

Dated 9th May, 1862.

1375. W. P. Gaulton and M. Booth, Manchester—Imp. in apparatus or machinery for damping and steaming fabrics, part of which imp. are applicable for distributing fluids for other purposes.

1379. J. Fowler, Leeds, and J. King, Chadshunt, Warwickshire—Imp. in apparatus for tilling land by steam power.

1381. C. Langley, Deptford—Imp. in apparatus for manœuvring ships and vessels.

1383. A. P. Price, 47, Lincoln's-inn-fields—Imp. in straps or bands for securing articles, parcels, or luggage.

1385. L. De la Peyrouse, 13, Panton-square—Imp. in treating neutral and acid, fatty, or oily substances, resins and resinous substances, and compounds or products containing paraffine.

Dated 9th May, 1862.

1393. Captain J. F. Bland, Dorset-square—An improved method of, and apparatus for, signalling between targets and shooters.

1395. J. Oxley, Frome—Imp. in apparatus for facilitating the processes of mashing and sparging in breweries and distilleries.

1397. N. Symonds, 6, Cambridge-street, St. Pancras—Imp. of all kinds of wheels, framework, girders, columns, and stanchions, blades of blowing fans, and paddle-wheels for steam-vessels.

1399. Captain F. J. Bolton, Bolton-row, May Fair—An improved mode of, and apparatus for, displaying the lights in light houses.

Dated 10th May, 1862.

1400. G. C. Haseler, 19, Vittoria-street, Birmingham—Imp. in the manufacture of lockets, and of a new application of Parkesine as a substitute for glass in the construction of lockets and other articles of jewellery.

1401. J. G. Willans, 2, Clarence-place, Belfast—Imp. in the treatment of the product from iron blast furnaces (whether moulded or otherwise) usually termed pig or cast iron or castings.

1403. W. Clark, 53, Chancery-lane—The application of a vegetable fibre alone or in combination with other matters in the manufacture of felted and other fabrics, also as a substitute for flock or powdered wool, and as a material for padding or stuffing and for other useful purposes. (A com.)
1405. R. Moore, Cannon-street West—Imp. in the structure and appliances of ships and other vessels.
1407. R. Willoughby, Midway-road—Improved apparatus for exhibiting and giving rotatory and traversing motion to placards, advertisements, scenes, and other objects.
1409. J. House, Market Lavington, Wiltshire—Imp. in machinery or apparatus for crushing or reducing substances.
1411. E. Kolbenheyer, Vienna, Austria—An improved apparatus for making ices and cold beverages.
1413. W. Clark, 53, Chancery-lane—Imp. in lamps, and in apparatus for filling lamps with oil or fluid to be consumed. (A com.)
- Dated 12th May, 1862.*
1415. H. Walker, Gresham-street—Imp. in making handles for crochet needles, pencils, penholders, and other articles.
1417. G. Fuhrmann, 15, Passage des Petites Ecuries, Paris—Imp. in melting and boring cast-iron barrels, applicable to fire-arms and pieces of ordnance. (A com.)
1419. J. B. Pope, Haigh Moor Collieries, near Leeds—Imp. in apparatus for lowering and loading coals, minerals, or other substances.
1421. H. S. Firman, 73, Great Suffolk-street, Southwark—Imp. in apparatus for washing and cleansing textile fabrics or raw materials, and for forcing fluids or moisture from the same. (A com.)
1423. H. Bayley, Stalybridge, L. Newton, Oldham, and J. Greaves, Stalybridge—Imp. in machinery for turning, boring, cutting, shaping, and reducing wood and other substances applicable for the manufacture of various articles.
1425. Maj.-General W. N. Hutchinson, Plymouth—An imp. in screw propelled ships.
1427. H. Ashworth, Hyde, Cheshire—Imp. in machinery for opening and carding cotton and other fibrous substances.
1429. A. B. Freeland, 4, Chatham-terrace, Palace-road, Upper Norwood—Imp. in the preparation or treatment of hops.
1431. T. Buckney, Peckham Rye—Imp. in portable "tell tale" time-keepers. (A com.)
- Dated 13th May, 1862.*
1433. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the mode of carrying out submerged and other engineering works. (A com.)
1435. P. M. Lopez, Paris—Imp. in apparatus for sowing wheat or other grain or seeds.
1437. W. E. Newton, 66, Chancery-lane—Imp. in coffee pots and boilers for culinary purposes, part of which improvements are also applicable for generating steam. (A com.)
1439. G. Blake, Trowbridge, Wiltshire—Imp. in apparatus for warming apartments.
1441. R. A. Boyd, 11, Duke-street, Southwark—Imp. in the manufacture of bacon.
1444. W. Hartican, Islingword-road, Brighton—Imp. in fire-escape apparatus.
1445. R. A. Brooman, 166, Fleet-street—An improved means or apparatus for shunting trains. (A com.)
1447. W. Southwood, Kensington—Imp. in machinery for manufacturing nails from either hot or cold bars of iron or other metal.
1448. R. M. Latham, 71, Fleet-street—Imp. in steering apparatus. (A com.)
- Dated 14th May, 1862.*
1453. R. A. Brooman, 166, Fleet-street—An improved method and apparatus for the production of photographic and stereoscopic portraits and pictures. (A com.)
1454. J. W. Girdlestone, Canada Works, Birkenhead—Imp. in projectiles.
1455. H. Deacon, Appleton-house, Appleton, Lancashire—Imp. in the manufacture and production of certain colours, and in the apparatus employed therein.
1457. E. Whittaker and J. Clare, Hurst, Lancashire—Imp. in machinery or apparatus for preparing cotton and other fibrous materials to be spun.
1459. J. Smith, sen., Coven, near Wolverhampton—Imp. in thrashing machines.
1461. A. Nicole, 14, Soho-square—Imp. in stop watches and time keepers, and in instruments for measuring accurately short intervals of time.
- Dated 16th May, 1862.*
1478. P. M. Parsons, Blackheath—Imp. in ordnance and other fire-arms, and in tools for rifling the same.
1480. G. Hasletine, 100, Fleet-street—Imp. in churns. (A com.)
1484. A. A. Lamiable, 4, South-street, Finsbury—Imp. in cementing cast and wrought iron to obtain cast steel.
1488. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in the manufacture of ribs for umbrellas and parasols, part of which is applicable to the hardening of strips of steel generally. (A com.)
1492. F. Stocken, Halkin-street, Grosvenor-place—Imp. in carriages.
1494. A. V. Newton, 66, Chancery-lane—Improved machinery applicable to the cutting of leather and other like uses. (A com.)
- Dated 17th May, 1862.*
1496. C. Binks, Parliament-street, Westminster—Improved methods of obtaining oxygen and chlorine gases.
1498. R. Davison, London-street, and T. Johnson, Bermondsey—Imp. in machines for washing and cleansing casks.
1500. J. Hogg, jun., 4, Orleans-villas, Twickenham—Imp. in book covers.
1502. J. C. Hill, Abergavenny, and D. Caddick, Ebbw Vale, Monmouthshire—Imp. in puddling furnaces.
1506. F. E. Sicksel, Golden Cross Hotel, Strand—An improved apparatus for steering vessels.
- Dated 19th May, 1862.*
1508. J. Wright, 42, Bridge-street, Blackfriars—An improved method of sheathing iron or metal ships, in order to protect them from the action of salt water, fouling, and other such like influences.
1510. R. Ramsden, jun., Kingsland-road—Imp. in machinery or apparatus for mashing malt.
1514. J. Lee, Church-gate, Leicester—Imp. in the construction of traction engines.
- Dated 20th May, 1862.*
1518. M. A. F. Mennons, 24, Rue du Mont Thabor, Paris—Imp. in certain descriptions of breech-loading fire-arms. (A com.)
1524. W. Clark, 53, Chancery-lane—Imp. in paddle and other hydraulic wheels. (A com.)
1528. W. Petrie, Charlton, Kent—Imp. in vessels for boiling chemical products as sulphuric acid, and in apparatus for indicating the degree of concentration and temperature of such products in the boiler, which apparatus is applicable to other pyrometric purposes.
- Dated 21st May, 1862.*
1532. W. H. Burnett, Margaret-street, Cavendish-square—Imp. in the mode of working telegraphic lines, and in instruments and apparatus employed for telegraphic purposes.
1534. W. Bush, Tower-hill—Imp. in the construction of ships, and in shields or armour for ships and batteries.
1536. L. Leins, Bucklersbury—Imp. in travelling bags and apparatus used therewith.
1538. W. E. Newton, 66, Chancery-lane—Imp. in the manufacture of metallic or mineralised fabrics or surfaces. (A com.)
- Dated 22nd May, 1862.*
1540. C. W. Siemens, 3, Great George-street, Westminster—Imp. in electric telegraph apparatus. (Partly a com.)
1546. J. Kennedy, Whitehaven—Imp. in protecting the sides and decks of ships from the effects of projectiles.
1550. H. Cook, Manchester—Imp. in electric batteries. (A com.)
1552. W. Evans, Commercial-road East—Imp. in obtaining motive power by machinery.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1547. A. B. Childs, 481, New Oxford-street—Imp. in wringing machines. (A com.)

PATENTS SEALED.

[From Gazette, May 30th, 1862.]

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|-------------------------|--------------------------------------|
| May 12th. | 3185. A. Treuille and F. X. Traxler. |
| 3024. G. Ralston. | 3196. W. Clark. |
| 3036. J. Hemingway. | 17. J. Gutknecht. |
| 3040. H. G. Hacker. | 70. A. R. Le Mire de Normandy. |
| 3044. R. A. Brooman. | 327. A. McKenzie & F. Panthel. |
| 3048. J. Knowlend. | 555. J. Sim. |
| 3052. J. Cochrane. | 794. T. Marsh. |
| 3056. J. D. Napier. | 903. H. Pooley, jun. |
| 3068. G. Clark. | 933. J. T. Loft. |
| 3072. W. N. Hutchinson. | |
| 3167. S. Sheppard. | |

[From Gazette, June 3rd, 1862.]

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|--|---|
| June 3rd. | 3090. H. Alexander. |
| 3065. H. G. Schramm. | 3094. V. L. Daguzan. |
| 3067. T. Laws. | 3115. W. E. Wiley. |
| 3069. R. Jolley. | 3117. W. S. Longridge. |
| 3075. T. Mellodew, C. W. Kesselmeier, and J. M. Worrall. | 3249. E. Lord. |
| 3076. B. W. Gerland. | 3263. T. Green, W. Green, and R. Mathers. |
| 3082. J. Fordred. | 368. T. Coltman. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, June 3rd, 1862.]

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|---|---------------------|
| May 26th. | 1390. R. Barclay. |
| 1301. G. F. Chantrell. | May 30th. |
| 1311. W. Weild. | 1325. A. Smith. |
| 1321. R. A. Brooman. | 1326. W. Grimshaw. |
| 1275. T. Webb and J. Craig. | 1395. C. De Bergue. |
| May 29th. | May 31st. |
| 1331. O. Maggs. | 1361. J. Wilson. |
| 1335. A. Micklethwaite, J. Peace, and S. J. Hobson. | 1370. A. R. Arrott. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, June 3rd, 1862.]

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|---------------------|----------------------|
| May 26th. | May 31st. |
| 1243. C. T. Dunlop. | 1263. H. Cartwright. |
| May 28th. | |
| 1224. J. B. Acklin. | |

Journal of the Society of Arts.

FRIDAY, JUNE 13, 1862.

INTERNATIONAL EXHIBITION OF 1862.

SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £451,900, have been attached to the Deed.

ELEVENTH ANNUAL CONFERENCE.—NOTICE TO INSTITUTIONS.

The Eleventh Annual Conference between the Representatives of the Institutions in Union and the Council, will be held on Monday, the 23rd inst., at 12 o'clock, noon. Sir Thomas Phillips, Chairman of the Council, will preside.

Secretaries of Institutions in Union are requested to forward, *as soon as possible*, to the Secretary of the Society of Arts, the names of the Representatives appointed to attend the Conference, stating at the same time, if possible, whether those gentlemen will also be present at the Society's Annual Dinner, which will take place on the following day, and of which particulars are given below.

The Chairmen of, or Representatives from, the Local Boards of Examiners are invited to attend.

The Council will lay before the Conference:—

1. The Secretary's Report of the Proceedings of the Union for the past year.
2. Report of the Society's Examinations for the present year, and the Programme of the Examinations for 1863.
3. The Report of the Examinations of the Central Committee of Educational Unions instituted last year.
4. The new List of Lecturers, printed in accordance with the wish expressed on the last occasion, as well as a List of Subjects suitable for Discussion Classes in Institutions.

The following subjects are suggested for discussion:—

5. Whether arrangements can be made to enable Excursion Parties of Institutions in Union to visit the Inter-

national Exhibition on some day or days to be agreed upon.

6. The propriety of directing the attention of the Committees of Mechanics' Institutions to the best means of rendering them places not only of instruction but of rational amusement for their members. In this would be included the question of providing refreshments.

7. The question as to the length of the periods for the payment of Subscriptions to Institutions, whether half-yearly, quarterly, or at shorter intervals.

8. The attention of Institutions will be called to the importance of establishing, from time to time, Special Local Exhibitions and Local Museums, by means of the efforts of the inhabitants of the various districts.

9. The expediency and means of establishing Competitive Exhibitions by Artisans of their works of skilled labour.

Notice of any other subjects which the Representatives may wish to submit to the Conference, should be given to the Secretary of the Society of Arts.

ANNUAL DINNER.

The One Hundred and Eighth Anniversary Dinner of the Society will take place in the Refreshment Room over the Central Entrance from the International Exhibition Building to the Horticultural Gardens, on Tuesday, the 24th inst., at half-past five for six o'clock punctually. The Right Hon. W. E. Gladstone, M.P., will preside.

Applications for tickets (price fifteen shillings each) should be made to Mr. S. T. Davenport, at the Society's House; and it is particularly requested that those who intend to be present will take their tickets as early as possible in order to facilitate the arrangements.

CONVERSAZIONI.

The second and third Conversazioni of the present season will be held at the South Kensington Museum, on the 9th of July and the 8th of October.

WHAT IS GOOD IRON, AND HOW IS IT TO BE GOT?

(Concluded from page 466.)

In a time of depressed trade the wrought-iron manufacturer has an opportunity—which it might be thought he would not miss—of buying the best pig-iron at a cheap rate. But he himself is the first to feel the pressure. It is the demand for wrought iron that slackens in the first instance; and, whatever be the evils which excessive competition occasions by holding out temptations to economise in quality, they are greatly exasperated by the struggles of a declining trade.

Such a time of depression is the present. It commenced with the American failures and the monetary crisis of 1857, and continued with increasing severity till the beginning of 1859, when the market showed symptoms of recovery. But the French Emperor's declaration of war against Austria destroyed confidence and paralyzed commercial enterprise throughout Europe; and subsequently the American tariff deprived the English manufacturer of

the chief foreign outlet that was left. It is to be hoped the depression has reached its lowest point. Prices can hardly be lower, but it is only too possible that more furnaces may be blown out, and more firms forced out of the trade. The large orders of Government for armour plates and other articles for which a superior quality of iron is confessedly required, ought to have given an impulse to the market, so far at least as to increase the demand for the best iron, of which the supply is so very small; but this is not the case, and the inference is irresistible, that the manufacturers do not employ the best iron. It might, indeed, be supposed that the mere anticipation of a general recognition of the need for first-class iron would produce some effect on the market; but the discouragements of long continued depression deaden all commercial energy. At such a time speculators fear being too soon rather than too late in the field. Each man hopes not to be last in a race in which as yet no man has started, and he hesitates to make the first move. All as yet remains motionless.

This, then, is the paradoxical condition of the iron-trade, which we have endeavoured to explain by tracing the steps by which it has been reached. No blame is imputed to the manufacturers as a body, who have only obeyed the laws which regulate all commercial transactions. It would be foreign to the purpose to note the struggles of individuals who have held a course in opposition to the current of the times: we have to deal only with general results. On the one hand we see a rapid declension in the use, and therefore in the production, of first-class iron; involving a complete change, material and moral, in the iron-trade. On the other hand, we find a reaction in favour of the best iron, which, though real, has hardly yet advanced beyond words. The public have discovered that, for certain purposes of great importance, the substitution of cheap iron for good is a failure, but the pressure on the manufacturers is not yet sufficiently strong to divert them from the policy and practice of years; and hence it is that, amidst all talk about first class iron, the demand for it has not increased. This circumstance is favourable at least to those who desire to be purchasers. But it is scarcely possible that Government should avail itself of the opportunity. No Government can act with the energy and decision of an individual trader. It lacks central motive power. It is a huge giant, rendered helpless by the feeble and defective action of the heart. The question is not only, What Government ought to do? but, How much can it do of what it ought?

Its first active step was highly judicious. More than a year ago it appointed a Commission, composed of men well known to the world for their scientific attainments, their practical acquaintance with the manufacture of iron, or their knowledge of the requirements of the naval and military services, for the purpose of collecting such information as it will need for its guidance as one of the greatest consumers—or it may be one of the greatest manufacturers—of iron in the country. No measure could be better advised to restore confidence to the manufacturers—with whom, for reasons to be referred to presently, Government had become unpopular as a customer—and to give in some degree to Government itself the knowledge and the confidence necessary to act with decision.

But, however valuable may be the labours of the Commission in investigating the points to which their attention is specially directed, no more important service can be expected from them than the revival of those elementary truths the neglect of which has caused, and still threatens so much mischief. Nothing short of such an authority is needed to re-establish the fundamental axiom already mentioned, that "in every stage of the iron manufacture, from good materials alone can first-rate quality be produced." Nor less important is its corollary, that "The quality of the materials is a necessary guarantee for the quality of the produce." The best materials, indeed, avail little without the skill to work them, but nothing good can be made from bad materials, however skillfully combined and worked.

The reader knows already what are the best kinds of pig-iron; the operation of manufacturing them into the best wrought iron may be made intelligible in a few sentences.

The second process in the iron manufacture, which is the most delicate and difficult of the whole, is called "puddling," because the operator or "puddler," manipulates the liquid metal in a small furnace, much as the labourer kneads the clay and water to form an impervious substance. In the first place, a judicious selection of the best pig-iron must be made. But, before proceeding, it is desirable to clear up an ambiguity which clings to the word "best" as applied to iron. So many are the uses of iron, that no iron is the best in the sense of being the best for *all* purposes; but, in common parlance "best," used generally, denotes the first-class iron—the grey cold-blast, including all its various denominations applicable to different uses, and bearing different prices; "best" used with reference to a special purpose, means that denomination of first-class iron most suited to that purpose. In the present case it does not imply the more expensive denominations of the cold-blast pig-iron, which are reserved for the manufacture of the highest class of machinery, but the "grey-forge" and the strong-forge," which are specially adapted for the operations of the puddler. It is not desirable that the iron selected should be all of the same make—for the best makes are in most cases improved by intermixture—nor even that it should be exclusively of "cold-blast." Small quantities of certain kinds of "hot-blast" may be combined, so as to improve the quality of the compound; and in the knowledge of these mixtures lie the art and the secret of the forge-manager. When the pig-iron thus selected is put into the furnace, it is "boiled;" and in the course of this process (which it is unnecessary to describe in detail) it casts off its impurities in the "cinder;" hence it is obvious why this cinder, if thrown again into the smelting furnace, must damage the quality of the produce. If any part of the "charge" remains unmelted when the bulk of it is ready for working, the "ball," or conglomerated mass of white-hot iron into which the labour of the puddler works the molten metal, is unfit to be subsequently manipulated into the highest class of wrought iron. Care also must be taken that the fuel employed should be the freest from sulphur that can be procured; and the "fettling" of the furnace, as it is called—that is to say, the arrangements made to protect it from the action of the liquid metal—should be of the best kind.* The white-hot ball just mentioned is taken out and subjected to the action of an enormous hammer, and while still red-hot is drawn out by means of "rolls" into bars or billets. It is now called "puddled iron," and is considered to be in a *half-manufactured* state; but when made of the materials and with the precautions just mentioned, it is already more advanced than is generally believed. We have seen a wire of the size of a thread which had been drawn from a rod produced direct from a puddled billet in the mill, and to such iron as this any degree of quality that is desired may be given by further manipulation.

But it is only to the best iron that fresh virtue is imparted by repeated working, and there is at last a limit beyond which even the best can endure it no longer. The prevailing notion that *all* iron alike is improved by manipulation is doubtless derived from the traditions of the old time, when all iron was produced by the cold-blast; and it has survived the state of things which once made it true. In the present condition of the manufacture it has led to ruinous mistakes. Inferior iron very soon attains the point after which it loses by being again subjected to the action of the fire; and by the time it has reached the stage of "merchant bar" it cannot be worked

*No positive rule can be laid down as to the best kind of "fettling." Each district has its own method, which is probably the best suited to the materials. The point is one of great importance, as it seriously affects the quality of the iron.

further with advantage. Here, then, is an easy practical rule for the manufacturer's guidance. When he needs iron for any purpose that implies repeated workings of the metal, he only prepares disappointment for himself or his customers if he is induced to employ any but the best quality.

For the present purposes of Government it will be universally admitted (in words at least, if not in practice) that none but the best iron can safely be used. But there is another point of great practical importance, on which there seems to be a want of clear understanding between the Government and the contractors. The best iron may be so manufactured as to be endued with the different properties of either hardness or toughness as its distinguishing characteristic. The greatest degree of hardness of which iron is susceptible cannot co-exist with the greatest degree of toughness which, by a different mode of manipulation, might be given to the same piece of metal. Hard iron, even the very best, must to a certain extent be brittle. Tough iron gives up a portion of its hardness to retain its tenacity. If to samples of hard iron there is applied a test to prove their sharpness, they will probably be found defective. But it by no means follows that the iron thus rejected is necessarily of an inferior quality.

In the first instance then, to save time, money, and disappointment, it should be made clear whether toughness or hardness is the quality required. If, for example, it is intended to replace the cinder rails, which are splitting, and crumbling away on many of our principal lines, it is plain that in constructing the new rail the surface part of it cannot be made too hard; but the lower part should be tough, in order to bear the prodigious strain to which, both laterally and vertically, it is subjected. It is accordingly proposed to make the "head" as it is called, of "steely" iron, but the lower part of the rail of tough iron of good quality.* The same device has already been adopted for the best tires. The outside of the tire is made of a quality approaching to steel, but the inner portion nearest the wheel is of the best tough iron.

In the iron for armour-plates it is understood that the highest authorities, both practical and scientific, concur in opinion that toughness is the quality to be aimed at, and in that case the best "puddled bars" are the only proper material. If, indeed, it is desired to make a *hard* plate, scrap-iron, which is cheaper than puddled bars, is well adapted for the purpose. But it is a point of the greatest importance—the misapprehension of which would cause serious mischief—that only the best scrap-iron should be employed. The term "scrap" has reference to form only, and it must not be assumed that fragments of good iron and fragments of bad are equalized in quality because they are identified in name. The best scrap-iron consists of the fragments collected from the workshops of the smiths and the boiler-makers, who do not use the inferior qualities of iron. It is cheaper than the puddled bars, because it is the remnant of a manufacture which has already made its profit, and because it is applicable to only a limited number of purposes. Between the best scrap-iron and the best puddled iron the difference is not in the original quality, but in that which has been imparted by further manipulation: the scrap-iron, having already been so frequently worked, becomes hard, and to a certain extent brittle, by the complicated process of the armour-plate manufacture, throughout which the puddled iron retains its fibrous texture and its toughness.

But if under the name of scrap-iron are swept off the miscellaneous contents of the marine-stores, of unknown quality, varying from the best to the very worst, of unequal sizes, and coming to the welding-point at different temperatures; and, above all, if "old rails" are smuggled in under a new name, the question between scrap-iron and

puddled bars is no longer one of manipulation only, but also of quality.

If scrap-iron is employed to any extent, it is hard to say what precautions would suffice to prevent use of the improper kinds. The supply of best scrap-iron is altogether insufficient to meet a large demand. Old rails—which are almost universally made of cinder-iron—may be had at 20s. less than the best scrap-iron, and 40s. or 45s. less than puddled bars. Cinder-iron is an element of weakness wherever it is introduced. It is not turned into good iron by being broken small, and it is only made worse by further working. It would be as hopeful to find the philosopher's stone and turn cinder-iron into gold as to work it into an efficient trust-worthy armour-plate.

Among the many experiments which it is understood have been tried at the arsenals, there remains untried one which well deserves consideration, and may lead to important results. It is most desirable to ascertain the effect of armour-plates made of puddled bars; and the experiment involves no preliminary expense. At Portsmouth and elsewhere there are the hammers and machinery necessary for forging the plates; it only remains to secure puddled bars of the best quality, and on this point there is no fear of being deceived; for, however difficult it may be to *make* the best puddle bars, the process by which they are *tried* is simple and intelligible. It is merely necessary to strike them with a heavy hammer so as to bend the extremities, *both when red-hot and when cold*; for iron destined to make plates should stand both these opposite tests: not, indeed, because an armour-plate is ever to be made red-hot, but because the iron, if not of a quality to be pliable when heated, will not retain its toughness throughout the workings which it must undergo before it is formed into a plate.

By the course proposed, the Government also would secure the advantage of comparing the expense and efficiency of its own hammered plates with the plates, both hammered and rolled, of its contractors: and moreover it would be much assisted in deciding the great practical question whether the State should turn manufacturer on its own account; that is to say, whether it should buy the pig-iron, and then carry on all subsequent operations at its own works. The security as to the quality of the iron, the very great economy of saving the contractor's profit, and the independence of action which would be obtained by such a plan if it were ably carried out, are advantages of the utmost importance. But, on the other hand, the heavy preliminary expense, the long delay of preparation, the possible loss and discredit of failure, are formidable objections. The one great difficulty, however, is to find, at first and for every part of the operations, competent management and competent superintendence of that management. It is said that the foundry at Woolwich was constructed on the most approved plan, and was conducted by managers of zeal and ability; but in one point there was a deficiency—there was a want of knowledge of the pig-iron manufacture and of the trade. The managers bought ordinary iron, such as is sent into the market for ordinary purposes, and they analyzed and tested, they broke and they twisted, and, finding none that came up to their standard, they jumped to the hasty conclusion that cast iron is unfit for ordnance.* Had they called in the aid of competition, and invited iron-masters to send specimens of iron specially manufactured for ordnance purposes, they would, it is believed in the "trade," have procured a material approaching nearer in toughness to wrought iron than would at present be thought possible, and at a cost which (whatever price may be put on the specially manufactured iron) would have been trifling in comparison with the expense of the wrought-iron ordnance.

The failure of this experiment—which seemed so hopeful, and which so nearly succeeded—naturally raises fears for another experiment of the same kind, but on a much

* It has been much disputed whether the two qualities of iron can be satisfactorily welded together, but the difficulty has been overcome, and there is no doubt but that an efficient and durable rail might be thus manufactured at a reasonable cost.

* The American method of casting ordnance hollow is said to be well worth our own consideration.

larger scale, and of much greater difficulty and greater risk. The proposed plan offers a middle course. By hammering their own plates with such machinery as they have now at their disposal, the naval and military Boards will incur no loss if they afterwards abandon the design of manufacturing; and if, on the other hand, they persevere in it, they will gain by this previous essay the knowledge and the confidence to proceed. If a plan so vast as the establishment of Government manufactories of iron for all naval and military purposes is ever to be successfully executed, it can only be done by expanding it gradually, and making sure of one step before another is hazarded. Time is needed to find, and experience to form, the men who are to carry it out. If the experiment of hammering plates is attended with success, the Admiralty may be tempted to lay down mills for rolling them and for other operations; but till its managers become very dexterous and expert as iron masters, it would do well to avoid the operation of "puddling," and to continue to purchase puddled bars. In times of prosperity there is little of puddled iron in the market, as the manufacturer needs for his own use all that he makes, but at present the Government would have no trouble in procuring it; and, if the demand were likely to be permanent, forges would soon be constructed for the express purpose of providing the supply required.

Till the State turns manufacturer, there remains to be solved the great problem how to secure from contractors an article of the best quality in exchange for the best price. It is found by experience that the presence of a Government Inspector at the works is utterly insufficient for the purpose. A paragon of integrity and ability, possessing all the knowledge of the most accomplished iron-master, and gifted with the eyes of Argus and the vigilance of Cerberus, without his taste for a sop, would be unequal to the task, unless he were endowed with powers of ubiquity; and, if at last the execution of the contract is unsatisfactory, the Government is debarred from remonstrance or redress, as each step in the process has been sanctioned by its own inspectors. It would be better to substitute for the continuous inspection of a resident agent the occasional visits of a person higher in station and authority, whose business it should be to come at irregular intervals and without notice, to inspect the work and the materials, and to transmit specimens of both to be subjected to the appropriate tests, both chemical and mechanical, and also to look over contracts and invoices, and satisfy himself that the materials are in accordance with the spirit of the contract. In this there can be nothing offensive to the manufacturer. This mode of inspection exacts from him nothing more than the presence of a resident agent was intended to secure. Inspection of any kind implies want of confidence: there is no additional offence in making the inspection an efficient one. Truth has no aversion to daylight. Government, in this instance, has not shown itself one of those unreasonable customers who haggle for price, and expect impossibilities. It has ascertained that for its present purposes the best materials are required. It has agreed to a price which amply covers the cost of the best materials; and assuredly it may claim the right—or rather is bound to acknowledge the duty of ascertaining that the best materials are actually employed.

If the present preparations for national defence are carried on, it is manifest that, either as manufacturer or consumer, and more probably both, Government will for some time to come have very extensive dealings with the iron-trade. But unfortunately the regulations of the public offices are ill suited to such a conjuncture. Strict rules are undoubtedly necessary to prevent public business being hindered by the caprice or dishonesty of contractors, and the endless intricacies of form and routine have been introduced as the best safeguards against corruption; but they impede the intercourse with the manufacturer, and they paralyse the action of official Boards to the most mischievous extent. Some time ago an advertisement

appeared in the *Times* inviting tenders for supplying the Admiralty with "melting" iron. On application at the office it was found that tenders were wanted only for the supply of the iron of two specially-named firms! Probably no one is to blame for this absurdity. The board could not throw the matter open to real competition, for there was no one to take on himself the responsibility of deciding between the competitors; they could not send an order direct to the firms in question, as any private company would have done, for there was no one to take on himself the settlement of the price. Not to incur responsibility must of necessity be the limit of every subaltern's ambition. If he steps beyond this, if he attempts to benefit the public service beyond what is written, he has to encounter ridicule and obloquy from his equals, and is not always rewarded by encouragement from his superiors; he has no resource but to shelter himself behind precedent, and take refuge in unchangeable routine. The regulations which insist that samples for trial shall be paid for by the manufacturer, and many other galling pretensions which could be set up by no other customer, save in reality nothing to the public, and place the Government in a position of great disadvantage. Manufacturers complain that their work is in many cases submitted to incompetent judges, who decide without appeal; and delusive competition, established merely to avoid official responsibility, deprives the Government of all the advantages which a real competition would secure.

The object to be attained is to confer on Government powers as nearly as possible approaching to the freedom of action possessed by a private firm, without unduly relaxing the restrictions which must be imposed on a public office; and to place its relations with the market as far as possible on the same easy footing as those of every other trader. All schemes which have been devised for this purpose resolve themselves into the appointment of an officer or a board, with varying devices for securing the honesty and capacity of these new officials. The objections to such a plan are many and weighty, and the time is not yet come when the Government could be induced to adopt it, or indeed would be able to carry it through Parliament. But at least palliatives may be applied. Heads of departments might do much by examining into details which are not usually brought before their notice, and by revising the rules of their respective offices with reference to purchases and contracts for iron. Without forgetting that they are Ministers of the Crown, let them consider what should be their course if they were the chairmen of great trading companies. Great companies, it is true, are often encumbered with many of the difficulties of routine which beset the offices of the State; but to a different degree, or their business would come to a standstill. Government may be assured that the impediments with which it has surrounded itself are very repulsive—never else could so much unpopularity have attached to a customer whose credit is so good and payments so regular.

Above all, the Government wants agents who possess the information which every individual similarly situated would require for the protection of his interests. As a mode of providing such for the future, it might be advantageous to encourage some of the many intelligent officers in the service of the various departments to acquire a practical knowledge of the iron trade, to the extent of learning the products of the different districts, the properties and qualities of the various makes of iron, the theory of intermixing them with the best effect—in short, to gain a general acquaintance with the nature and management of the various processes of the manufacture. To this might easily be added the study of chemistry and mineralogy, so far as they bear on the production and working of iron. All this would be but superficial information, if they were to turn manufacturers on so slender a stock; but thus instructed they would be intelligent negotiators in all dealings with the iron-trade, and they would relieve their respective boards of the

helplessness and distrust—the necessary consequences of ignorance—which have so much impeded the transactions of Government with its contractors.

Never before did there occur an instance in history where a matter of commercial and manufacturing policy assumed such gigantic importance as belongs to the iron question at the present moment. If, a quarter of a century ago, a political economist had been asked to name the conditions most favourable to the security and prosperity of the country, he could have devised nothing more promising than that supremacy in commerce and in war should be made dependent on superiority in the manufacture of iron; that iron should be the armour of our navy, and the material of our commercial marine—perhaps, too, the coating of our fortifications. Such conditions have been realised; but instead of the energy imparted by knowledge and experience, instead of the alacrity of anticipated triumph, they find among us error and bewilderment. Instead of pouring into our docks and arsenals a steady supply of impenetrable ship and armour plates, we are disputing about what is good iron, and are struggling to use what is not. Nevertheless, the impulse is given—ill or well the movement will go on—our wooden walls are rapidly transforming themselves into iron. The cost will be enormous. It depends on the direction for good or for ill now given to the iron manufacture whether the expenditure be not made in vain.

ASSOCIATION FOR THE PREVENTION OF STEAM-BOILER EXPLOSIONS, MANCHESTER.

At the last ordinary monthly meeting of the Executive Committee of this Association, held at the offices, 41, Corporation-street, Manchester, on Tuesday, May 27th, 1862, Thomas Schofield, Esq., in the chair. Mr. L. E. Fletcher, chief engineer, presented his Monthly Report, of which the following is an abstract:—

“During the last month there have been examined 316 engines and 464 boilers. Of the latter, 9 have been examined specially, 10 internally, 74 thoroughly, and 371 externally; in which the following defects have been found:—Fracture, 6 (3 dangerous); corrosion, 50 (7 dangerous); safety-valves out of order, 6; water-gauges, ditto, 15; pressure-gauges, ditto, 5; feed-apparatus, 1 (dangerous); blow-off cocks, ditto, 34 (2 dangerous); fusible plugs, ditto, 6; furnaces out of shape, 6—total, 129 (13 dangerous). Boilers without glass water-gauges, 29; without pressure-gauges, 10; without blow-off cocks, 34; without back pressure-valves, 33.

“Explosions continue to occur to every description of boiler. One has happened during the last month to a locomotive in the vicinity of London, and another to a stationary boiler on the Clyde. Both of these were—as it is hardly necessary to state—beyond the sphere of the operations of the Association. Each of these explosions was attended with fatal consequences, but I am not at present in possession of the engineering facts.

“The recent very frequent occurrence of explosions has monopolised, by the bare recital of their details, the entire space of the late reports, and left no room for considerations resulting from them, to which I think it is important attention should be drawn, and this, therefore, I now purpose to do.

“It will be remembered that one of the late explosions arose from the failure of an angle iron, on which alone—as on a single thread—a large crown plate depended for its support. Several other explosions occurred to externally-fired boilers through failure of the plates just at the seams of rivets exposed to the flame. In some of such cases the plate is found to crack at the rivet holes; in others leakage occurs, from which corrosive action sets in,

and steadily continues until the plate becomes so thinned that rupture and explosion ensue. Some explosions have occurred from corrosion, consequent upon external damp; others, from acidity of the water; while others again, of somewhat earlier date, have been occasioned by the collapse of the furnace tubes, consequent upon the weakness of construction, which would have been remedied by the adoption either of flanged seams, or angle-iron hoops, or other similar means.

“Thus it will be seen that all the above explosions occurred from the most simple causes, and that no mystery whatever need be attached to any one of them; while by suitable construction of the boilers in the first place, and due attention to their state of repair in the second, these explosions would in every case have been prevented.

“I am extremely desirous to keep this practical view of steam boiler explosions constantly in sight, since I am persuaded no head will be made against them generally as long as their causes are considered to be matters of mystery, and their occurrence one of chance.

“Very few of the explosions that come under my notice occur from shortness of water, and I believe that to be a much-abused idea, and the number of explosions resulting from it to be much exaggerated. It appears to be an almost stereotyped verdict at inquests, and the boiler attendant being frequently killed, there is seldom any witness to the contrary.

“I find that by far the most frequent cause of explosion is the insufficiency of the boiler for its working pressure, either on account of its original construction, or state of repair consequent upon use; while those explosions resulting either from deficiency of water, or from extraordinary or reckless pressure, are comparatively rare. In other words, to prevent misapprehension, I find that explosion is more frequently due to weakness of the boiler than to excessive pressure of the steam.

“I know no means of ascertaining the sufficiency of the original construction of a boiler, or of testing the weakness produced upon it by wear and tear—in short, of testing either new or old boilers—equal to the use of hydraulic pressure, and think all steam users would do well to make systematic use of this test once a year. In France, I believe, this plan is rendered compulsory by the Government, and it would be well were it generally adopted in this country voluntarily. Weak places in the plates may pass undetected, even on careful examination, while some parts may be inaccessible and concealed from view, but the hydraulic test is sure to detect and expose them all. Its timely application would have saved that most disastrous explosion which occurred some time since, here in Manchester, at a locomotive establishment second to none in the kingdom for its high reputation, and since a defect passed unnoticed at such an establishment, where the construction of boilers, as well as the quality and strength of plates may well be supposed to have been thoroughly understood, it surely argues the necessity of the hydraulic test being generally applied.

“Mr. Muntz, a steam user in Birmingham, states, in a letter published on the Millfield boiler explosion, that he has for years adopted, with advantage, the plan of an annual hydraulic boiler test, and considers it a duty he owes to his workmen in consideration of their safety.

“The application of the hydraulic test is so simple, and the pump required so small, that each steam user could provide himself with one at very little expense, or some parties might find it worth their while to take up the proving of boilers by water pressure as an itinerant speciality of engineering practice. This Association would be glad to assist in the general application of the hydraulic test, by inspecting the boilers when under pressure, and I feel convinced that, were the practice of this annual test generally adopted, which I trust it soon will be, explosions would become nearly, if not entirely, extinct.”

YORKSHIRE UNION OF MECHANICS' INSTITUTES. — MEETING AT DEWSBURY AND BATLEY.

The twenty-fifth annual meeting of the above Union was held on the 22nd of April, the conference of delegates taking place at Batley, and the *soirée* at Dewsbury. There was an unusually large attendance of delegates from all parts of the country.

The conference commenced at eleven o'clock, in the Public Hall, Batley, Mr. E. BAINES, M.P., the President of the Union, occupying the chair. Mr. Milnes, M.P., Mr. J. D. Dent, M.P., the Mayor of Leeds, and the Mayor of Halifax were also present.

The CHAIRMAN, after referring to the alteration of the period of holding the meeting, and observing that he was happy to see by the attendance, which was unusually large, that there had been no serious inconvenience caused by the change of day, said he thought he might justly congratulate the delegates and members of the Yorkshire Union on their having met to celebrate the 25th anniversary of the Union, and that they did so under circumstances of continued harmony and usefulness. They began with a very small number,—some who were on the platform, as well as himself, saw a meeting at which only thirteen Institutions in Yorkshire were represented a quarter of a century ago, and now they had in the Union 143 institutions, containing an aggregate of upwards of 25,000 members. The last twenty-five years had been a period of very remarkable prosperity, and of a degree of popular improvement and of intellectual and moral progress which had corresponded with the material prosperity of the country; and he thought that Mechanics' Institutions had contributed to, as well as shared in, this general improvement. They would all be very gratified to know that their Union also prospered, as well as the individual Institutes. During the past year, indeed, they had had a slight depression, caused by a decline in the commercial prosperity of the country; but that, they could not but hope, was altogether temporary, and would very soon be recovered.

Mr. J. KIRSON, jun., one of the hon. secretaries, read the report, in which the Committee congratulated the delegates upon the fact of the Union having completed a quarter of a century of existence, this being the 25th annual meeting. The treasurer's report is substantially satisfactory, and shows that there is a good balance in hand, so that the question of finance does not interfere with the efforts of the Committee, and there is ample means for the extension of the operations of the Union. The flourishing state of the society's finances is, in a great degree, due to the labours of the agent and lecturer, Mr. Barnett Blake, who loses no opportunity for pressing the claims of the society on the friends of education, and who also transacts the current business with regularity and assiduity. Mr. Blake has delivered 51 lectures, attended 15 *soirées*, and paid 81 visits to Institutions for the purpose of giving advice and assistance. The following statement conveys a general idea of the position of the Institutions composing the Yorkshire Union:—

SUMMARY OF THE RETURNS FOR 1862.

Number of Institutes in the Union	143
Total numbers of members estimated at	25,000
Reports received from Institutes	128
Number of members reported in 124 Institutes—Males 19,846	
Do. do. do. Females 2,430	
Annual income of 106 Institutes	£12,160
Number of volumes in the libraries of 116 Institutes	137,250
Number of issues of books in 101 Institutes	307,838
Number of issues to each member	17
Number of books added during the year to 116 Institutes	5,944
(Being an increase of 4·5 per cent.)	
Number of periodicals taken in 113 Institutes:—	
Weekly	355
Monthly	600
Quarterly	60
	1,015

Newspapers	979
Number of lectures delivered at 93 Institutes	504
Of which 117 were paid, and 387 gratuitous, and they have been classified as follows:—	
Scientific	112
Literary	363
Musical	29
	504

In 83 Institutes, containing 18,473 members, the number of pupils belonging to classes is returned	7,658
In 79 Institutes, containing 12,371 members, the number of members belonging to the operative classes, dependent on weekly wages, neither clerks nor bookkeepers, is returned ..	8,719
(Being a proportion of 70·6 per cent.)	
Institutes returned as exempt from local rates	31
Do. not exempt, or only partly so	24

COMPARATIVE TABLE.

	1861.	1862.	Increase.	Decrease.
	No.	p.ct.	No.	p.ct.
Members in 120 Institutes	22,590	22,089		501 2·2
Do. 51 do.	8,601	9,861	1,260 14·6	
Do. 69 do.	13,989	12,228		1,761 12·6
Females in 79 do.	2,459	2,282		177 7·2
Income of 105 do.	£12,373	£12,151		£222 1·8
Periodicals 106 do. W.	323	347	24 7·4	
M.	562	568	6 1·1	
Q.	58	60	2 3·4	
Newspapers	934	941	7 0·7	
Lectures at 79 Paid	120	111		9 7·5
Institutes ... Unpaid	423	345		78 18·4
Scientific	132	101		31 23·5
Literary	389	328		61 15·9
Musical	22	27	5 22·7	
Books in Libraries of 116 Institutes	131,306	137,250	5,944 4·5	
Issues in do. 94 do.	285,091	279,434		5,657 2·0
Pupils in Classes of 71 do.	6,966	6,911		55 0·8

The result of the comparison of these figures with those returned in former years is not very favourable. As compared with last year there is a decrease in every department, except in those of periodicals, books, and musical lectures. When the great efforts that have been made of late years to extend and to provide new buildings for Mechanics' Institutions are considered, and also when it is known in how many cases these efforts have been successful, it seems but natural to expect very different results. The numerous buildings that have been erected in the course of a few years have been provided by the liberality of the well-wishers of these Institutions, and in most cases have contained every necessary appliance and arrangement suitable for the object desired to be attained. The interest of the capital invested is equal to an annual donation of considerable amount, and in some cases is as much as 6s. 8d. per head per annum. This is a very large sum, and ought to be the means of placing the Institutions receiving it in the most prosperous position. The large Institutions in the Union maintain their position of usefulness. In a few cases they have made a slight advance, but the general course of the smaller Institutions has been retrograde. The explanations of this have in most cases referred to the general dulness of trade, and the consequent inability of operatives to pay the cost attendant upon their membership of an Institute. Many of the reports state that it is difficult or impossible to keep up the interest of lectures. It is not every place where gentlemen in sufficient numbers and of adequate ability can be found to give gratuitous lectures requisite to maintain the attractions of this form of instruction. The payment of competent lecturers, again, is quite beyond the means of many institutions, and, even where funds exist, it will often be found more useful to expend them in increasing the efficiency of the institution, in payment of teachers, or adding books to the library, than in lectures. It is, therefore, desirable that where good gratuitous lectures cannot be obtained, some substitute should be provided. Apparently one of the best that has yet been suggested is the plan of what is now becoming well known by the title of *Penny Readings*. This plan was originated at Ipswich, in 1859. It has been tried in one Yorkshire Institute—that of Masham—and the report speaks well, both of its success and of the "incitement given to young men to read and study the best authors, as well as the acquisition of a better style of language in which to

clothe their own sentiments in conversation." In other institutions they have also been tried and proved very attractive. In consequence of an instruction from the last Annual Conference of Delegates, the Committee obtained returns from the Institutes for the purpose of ascertaining what proportion of the members of Mechanics' Institutions belonged to the operative classes. Out of 79 Institutes that have sent in replies, and which contain 12,371 members, the large proportion of 8·719 or 70·6 per cent. are operatives. This shows that the common statement that "Mechanics' Institutions contain no mechanics" is not well founded. It is, however, a matter of deep regret that so large a proportion of the population, whether operatives or otherwise, avail themselves of the advantages such institutions offer. It suggests the inquiry whether, as a preparatory step, and as supplementary to the existing Institutions, there should not also be Institutions less ambitious in their character, aiming less at instruction, and more at the recreation of those classes whom it is desirable to secure from the influence of the temptations to vice. An Institution called the Working Men's Institute has been opened, which is more calculated to meet the tastes of the working man than anything Mechanics' Institutes have yet endeavoured to accomplish—in fact it partakes more of the character of a club. The admission fee is one penny per week, which pays about half the expenses, the rest being raised by a few patriotic and public-spirited gentlemen. The numbers fluctuate considerably, according to the attractions provided, but there are generally from 700 to 1,000 members. In addition to a library, reading-room, and regular gratuitous lectures, there is a room for chess and draughts, where not less than 100 working men are playing every night. There is also a lavatory and smoking room, tea and coffee being supplied at one penny per cup. There are dramatic performances by amateurs, and free concerts. There is also a Penny Bank in connection with the Institution. The number of Institutes either possessing buildings of their own, or in course of doing so, continues to increase. The Hunslet Mechanics' Institution has now a very commodious structure, ready for the opening ceremonial, which has been erected at a cost of above £1,600. At Guisbro', through the munificence of Col. Challoner, Joseph Pease, Esq., and others, an excellent building for a Mechanics' Institute has been erected at a cost of about £600. At Marske, which possesses an Institute really efficient in class instruction, the liberality of the Earl of Zetland has provided a site and £200 towards a building, and the fund having been increased by Joseph Pease, Esq., and others to about £600, the Institute will shortly be second to none in the country, in proportion to the population of the place. Even Appleton Wiske, a small village near Northallerton, will shortly have a building for its Institute in a style suited to its limited means. With such enormous examples of public spirit, it is not fitting that the capital of the West Riding should be left behind in the race, and it is therefore gratifying to notice that the Committee of the Leeds Mechanics' Institution are making strenuous exertions to obtain the necessary funds for the erection of a building suited to their requirements. It will comprise ample accommodation for the School of Art, in addition to a spacious lecture-hall and other rooms. The Committee have determined not to commence building until the sum of £10,000 has been raised, and it is hoped that the liberality of the public will very soon supply the small additional sum required to make up the amount.

Mr. B. BLAKE, the agent and lecturer of the Union, then read his report, in the course of which he observed:—"During the season just closed I have delivered about fifty lectures; and, confirming my previous experience, I have found those of an amusing character to prove the most attractive. They have not, however, been without their uses in increasing the attendance, and thereby affording a wider field in which to advocate the claims of the Institute to public support. It is a common complaint that, in very many instances, the attendance at lectures is

uncertain, and almost too small to justify the committee in incurring the necessary outlay. If the advantage of having lectures be limited to the simple test of whether they will pay, there can be little doubt that, in perhaps the majority of cases, they bring rather loss than profit. This is scarcely, however, a fair criterion by which to judge of their effects; they should be followed by increased attention to the subjects on which they treat; and they also serve to give additional publicity to the existence, the advantages, and the operations of the Institute—a point which has been too often neglected. Much, however, of the failure of lectures, as a means of usefulness, may be attributed to their desultory character, in many Institutes being delivered at long intervals, requiring special announcements, and, of necessity, involving additional expense with fewer equivalent results."

Mr. J. H. SHAW proposed the following resolution:—"That this meeting desires to record its sense of the heavy loss which Mechanics' Institutions, in common with the other educational bodies in the kingdom, have sustained by the decease of the late deeply lamented Prince Consort, by whose support and encouragement their progress has been greatly promoted, and whose memory they, in common with the rest of her Majesty's subjects, hold in the highest honour."

This was unanimously adopted.

Various subjects were then discussed, and a complimentary vote passed to Edward Baines, Esq., M.P., for his valuable services as President of the Union, and for his conduct in the chair.

An evening meeting was also held, at which R. Monckton Milnes, Esq., M.P., presided.

PAPER MANUFACTURE.

The Special Catalogue of the Austrian department of the International Exhibition is printed on paper in which maize fibres form the principal material. The following letter, in reference to the remarks in Mr. Hawes's paper on the Exhibition, has been received from Professor Arenstein, member and chief reporter of the Imperial Austrian Commission:—

"International Exhibition, 1862.

"10th June, 1862.

"15, Brompton-row, London, S.W.

"SIR,—Permit me to draw your attention to an ambiguity contained in the very interesting paper of Mr. Wm. Hawes, "On the International Exhibition of 1862," which appeared in the *Journal of the Society of Arts*, of the 30th May. In reference to paper manufacture, Mr. Hawes says:—"It may be interesting to mention that the Austrian catalogue is printed on paper made from maize fibres, mixed with cotton and linen rags; the French catalogue on paper made from maize and cotton rags." These lines may lead to the conclusion that the catalogue of the French exhibition is printed on paper made from maize and cotton rags, while the intention of Mr. Hawes was certainly to mention the fact that the English, French, and German editions of the Austrian catalogue are printed on three different kinds of maize paper, viz., the German edition on paper consisting of maize fibres and linen rags, the French on paper of maize fibres and cotton rags, and the English edition on paper produced from maize fibres and linen and cotton rags.

"I will thank you to insert this explanation in the columns of your *Journal*.

"I am, &c.,

"JOSEPH ARENSTEIN.

"To the Secretary of the Society of Arts."

The following remarks are taken from the Preface to this Catalogue:—

"Where shall we in future get our paper from, if the consumption of paper increases in the same ratio as hitherto, and rags are perpetually becoming dearer? This is the question long since asked not only by paper manufacturers, but also by those for whom the prices of paper

are of vital importance. Since rags cannot be produced at pleasure like many another raw material, we must direct our attention to a substitute that may answer the natural laws of supply and demand. Such a substitute is found in the maize plant. This plant affords excellent paper, whether its fibrous substance be intermixed with rags or not. In this catalogue we offer specimens of both pure and mixed maize-straw paper, the German catalogue being printed on paper consisting of maize fibres and linen rags, the French on paper prepared of maize fibres and cotton rags, the English on such as is produced from maize fibres, linen and cotton rags. The paper of the German catalogue is white; that of the French blue; and that of the English yellow, in accordance with the wish of the Commission. The covers of the French and the English catalogue are of the same paper, but thicker than that of the catalogue itself; whereas the cover of the German is made merely of maize fibre stuff. The present notice is, in all three catalogues, printed on pure, bleached maize fibre material almost entirely cleansed from its gluten. This sample shows that pure maize straw paper is characterised by a great degree of transparency. As exhibited in the octavo leaf bound up with this catalogue, the before-mentioned quality, among others, renders it excellent for tracing tissue paper; and this transparency being natural, such tracing tissue paper can be produced cheaper than any other artificial one. The maize fibre paper is also peculiarly suitable for lithographic purposes.

"By reason of the fibrous substance of the maize plant being endowed with extraordinary tenacity, it is especially to be recommended, like parchment, for documents and deeds. Maize straw paper resists the influences of time even more effectually than parchment, the gluten contained in the maize plant being better qualified than any other known material to resist putrefaction. Maize paper is, therefore, much less subject to decomposition than parchment, which consists of organic animal matter. As to the cost of production of maize straw paper, it would exceed that of paper manufactured of rags, if there had not recently been discovered a quality in the maize fibre, securing to it a far better means of converting it into use than by working it up into paper, viz., that it can be spun and woven like flax and hemp. This discovery has already passed the experimental stage, for there exist already establishments in Vienna and Schöglmühle, near Gloggnitz, where maize flax, as it is called, is spun and woven in considerable quantities. The process of producing maize flax is the inventor's secret, and patented in all great states of Europe; but all patents not yet being in his hands, productions of his new invention could not as yet be sent to the Exhibition. What renders maize flax weaving highly advantageous, is, that the worst waste of maize straw yields excellent paper, which is sufficiently proved by the paper manufactured of such waste and made use of for printing the present catalogue on."

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(Continued from page 153.)

SAN SEBASTIAN, SPAIN.—This province produces various rich ores, zinc ones especially—such as calamine and blende. The former is appropriated (as far as the cropings go) by the Royal Austrian Mining Company for its manufactory at Aviles, and 750 tons of the latter, containing about 40 per cent. of zinc, were exported to Belgium in the course of 1856. Numerous productive-looking veins of calamine and copper, although duly registered by their discoverers in conformity with the Spanish law upon mines, remain unworked, principally because land-carriage is so costly and insufficient; but according to official data before me, it seems probable that blendes, calamines, and galenas, will be shipped in rather considerable quantities. Coal has not yet been found, and the iron ore is of such inferior quality, that on an average,

3,000 tons of that mineral are annually imported from Biscay by undecked coasters, for the manufacture of the justly-celebrated fire-arms and other iron-work of Guipuzcoa. Since the termination of the Carlist war the industrial progress of Guipuzcoa has been rapid, and it now possesses four cotton, two cloth, four paper, two fire-arm, one anchor, two nail, two soap, one porcelain, one glass, and two composition-candle manufactories, besides an iron foundry, and sixty large forges. The cotton goods manufactured are "retortas" and "elefantinas" (domestics), together with printed calicoes,

SANTANDER, SPAIN.—Santander, a seaport town on the coast of Cantabria, bordering the Bay of Biscay, is situated in latitude 43° 28' 20" and longitude 0° 0' 4". It has a large open harbour or bay, by which it is bounded on the south, and the place is, consequently, much exposed to the strong gales of wind which blow from that quarter, and prevail in certain seasons of the year, particularly during the autumn. On the north the place is protected by a small ridge of hills which begins to rise at the entrance of the port, and continues for about six miles in a westerly direction. The town is built at the distance of 1½ mile from the entrance into the harbour. On the south side of the above-mentioned ridge of hills, and the old part of it, stands upon a bed of ground of a calcareous and argillaceous nature, similar to what is to be found in all the surrounding districts. The population of Santander, which is the capital of the province of the same name, is reckoned to be 20,000. The port is of good depth, capacious, and safe, and has good holding-ground. It is likewise of easy access for ships of any burden, at high tide. The rivers Cubas and Fijero, and a small stream from Solia, formed by the natural drainage of the upland, and mountains on the south, and eastern sides of the harbour, flow into the latter, but are navigable only for a very short distance by small craft. Not far from the entrance, towards the west, on Cape Mayor, there is a light-house with a revolving light, established upon one of the most recent and improved systems of modern invention. Another light-house, though of smaller size, is in course of erection, and it is expected will be shortly built on a rock called Pena de Mogro, at the very entrance of the harbour. The works for the cleaning of the port are carried on by means of two dredges driven by steam, and the luggers or barges which they fill with mud and sand raised from the bottom, are also taken away by a steam-tug to different places. A new mole, undertaken by private enterprise, has been begun of late years on the western side of the bay, and a wall of dry rubble is being built for the purpose of cutting away a portion of land which is covered by the water at high tide, and which will become the property of the contractors when finished. The direction of the wall is almost perpendicular to the quay and old part of the town. It runs towards the south, and will be 5,518 metres in length; the space of ground cut away by it measuring 538 hectares, and 28 ares. Close to the town, and in this new made ground, is the station of the Ysabel second railway, which is to join Alar del Rey and Santander about 70 miles from each other, will be built. The third of the section into which the whole line has been subdivided, viz., from Alar to Reinosa, a length of 27 miles, is on the eve of being opened to the public, and a few experimental trips have already been made on it. The produce of the province of Santander is principally Indian corn, or maize, and what is collected is barely sufficient to meet the wants of the inhabitants. Other kinds of grain are likewise cultivated, but in such small quantities, that it is not worth mentioning them. The flour consumed by the people and that bought for exportation, comes from the interior of the country, chiefly from the mills or corn-factories situated on the canal of Castile, which runs from Alar del Rey to Valladolid. It is transported in carts drawn by bullocks, and the carriage is both bad and expensive, not only on account of the length of time employed in bringing it to Santander, but likewise owing to the

bad state and condition to the corn is brought in the carts, which are open conveyances, or at most badly covered. Hence, too, the reason why so many cattle being necessary for the traffic on the roads, such great quantities of hay are required, the landowners allowing grass to be grown in their fields in preference to corn. The regular trade of Santander is almost entirely with the island of Cuba, to which island the flour from Castile is principally exported, bringing in return sugar, coffee, and rum; cocoa or cacao from La Guayra, and a few shipments of fish from Norway, Newfoundland, and Shetland; timber, planks, and also hides, oil, and rice, from the South of Spain, form the articles of commerce, though in small quantities compared with other substances required for human food. When there are bad harvests in other countries, it has been observed that trade becomes brisker in Santander, particularly in the exportation of flour, which is then brought down in large quantities from Castile. At present, also, great activity prevails in this branch of commerce, though contrarily to its natural course, the corn being brought from France and England for importation into Castile, as the granaries in the latter part of Spain became nearly exhausted during the last years, owing to the large quantities that were exported to the two former countries. Since the line of steamers has been established, plying direct from Santander to Nantes, and likewise between the former port and Bayonne, Liverpool, and Hamburg, calling occasionally at other places, such as Southampton, other classes of merchandise are received, principally silk, cotton, and woollen goods, also chemicals, drugs, and machinery, but almost wholly for the interior of Spain. According to the returns of trade, the value of such different classes of articles ascended in the year 1856 to £591,885 sterling, it being scarcely possible to certify the weight, measure, and contents of each bale, owing to the circumstance of their having been imported as transit goods, and, consequently, valued in a lump. One of the great articles of commerce in this province, (Vigo, Spain,) is the pilchard (Sardinian). The quantity of this fish caught on the coast, and in the bays along the coast, was much greater a few years ago. At present it may be reckoned that 600,000,000 are caught yearly; of which 200,000,000 are consumed in the province fresh or slightly cured, whilst 400,000,000, or 20,000 casks, weighing 12 quintals each, are salted and exported, chiefly coastwise, to ports in the Mediterranean, or on the north coast of Spain, some being exported to the Spanish colonies, to ports in South America or to Sicily. In this branch of industry alone, the value of 20,000 casks of pilchards exported may be estimated at 600,000 dollars, equal at par to £120,000, and the 200,000,000 retained for consumption in the province amounts to 60,000 dollars, or £12,000, making together a yearly product of 660,000 dollars, or £132,000. The last season the fishery of the pilchard has been very abundant, and its value may be estimated at 1,210,000 dollars, or £242,000. The oil of this fish also forms an article of commerce, and 10,749 gallons were exported in 1856. It is also consumed in the country by the lower classes for lighting, and the lees are purchased for tanneries. At Tubia, near Ferrol, are the splendid copper works belonging to the Spanish Government, where copper coin was cast about four years ago. It is now employed in the manufacture of copper in sheets and nails furnished to the royal arsenal at Ferrol, and also sold to the trade generally. The copper ore is the produce of the mines of Rio Tinto, in Andalusia.

Home Correspondence.

"A NEW MOTIVE FORCE."

SIR,—A paper appeared in No. 494 of the *Journal*, by Dr. Meschin, on a "new projectile force," and he alludes

also to a "new motive force." Two correspondents have made some remarks chiefly on the "projectile force," but it is perhaps owing to the fact that the "new motive force" is treated of only subordinately, that it has escaped the attention of many of your readers, far more competent to deal with such a subject than your present correspondent; but there are certainly some parts of the communication that ought not to pass unnoticed, as they have appeared in a *Journal* with so great a circulation, and possessing so much authority and influence with numbers of practical men, who probably have not the opportunity of following the more technical and scientific (but not the less real) bearings of the subject. It is to this "new motive force" alone I wish to draw attention.

Dr. Meschin's are evidently only hypothetical machines, and every one who has devoted any attention to such topics, has no doubt quickly discovered the very great difference between drawing up such a general scheme on paper and the practical carrying out of such a design in a working engine. One of your correspondents apologises for designating "Mr. Meschin's proposal a theory because every position assumed by that gentleman has separately passed through the ordeal of practical demonstration by eminent men." While discussing even the unbending laws of nature, it is no doubt policy (to put it in no stronger light) to pay the strictest attention to the laws of courtesy and good fellowship in alluding to writers whose views are being canvassed; but in the sentence quoted above, is not truth sacrificed (no doubt unwittingly) to the natural wish to wind up the note with a compliment? To commence with what may be designated—for the sake of easy reference—the four axioms with which Dr. Meschin starts (vide page 410), what "eminent man" has "practically demonstrated" the decomposition of water by frictional electricity, or even by thermo-electricity, except in minute quantities, which are quite out of the question in the present case? Allowing, however, the possibility of such a decomposition in quantity by friction, or as it may no doubt be done by magneto-electricity, there must be a motive power to start with, and doubtless the cheapest available method would be the use of steam power, as in the case of the North Foreland Lighthouse, where a steam-engine was used to produce the electric light through the agency of magneto-electricity. If this be so, it therefore follows that Dr. Meschin's second and third axioms cannot be rendered available for the economical production of a "new motive force," unless in some part of his circuit of operation he manages to get to the "blind side" of nature, and induces her, by his manipulations, to give him a larger amount of force than the experience of all other investigators has led them to think can be produced; for no law of physical science has been more clearly or more fully established, both by mathematical and experimental demonstration, than this—"an equivalent of matter in changing its form will produce an equivalent of force," and no more, whatever ingenious devices may be brought into operation. The delicate experiments of Joule, and the elaborate mathematical and experimental researches of Professor W. Thomson, not to mention other eminent physicists, have fully demonstrated the correctness of these views, as old, at least, as Liebig's earlier publications, and ably put forth many years since by Grove, in his "Correlation of Physical Forces." Any inventor who ignores this law will certainly do so to his disappointment and loss, and the shelves of the Patent Office contain many recent instances of this, so that it may be useful again to draw attention to it. The law just alluded to must also set aside the economical use of voltaic electricity as the source of the "new motive force." This may most certainly be affirmed in the present state of science, and it is difficult to conceive of any modification or improvement of the galvanic battery which can enable it to compete with coal as the source of mechanical power. The point alluded to at page 414, "If some method could be discovered of making the products of the battery nearly as valuable as the zinc, or other agent used, the great

problem would be solved," has not escaped more practical investigators, and it has been the subject of more than one patent. Dr. Watson's appeared to be the most hopeful, and excited some attention; it was taken up by a public company, but appears to have been a failure. This objection to the application of electricity, as a source of motive power, has been repeatedly brought before the public in connection with electro-magnetic machines. Professor Hunt read a paper before the Society of Arts on the subject in 1851, and although Dr. Meschin may reply that his "new motive-force" is a very different thing from electro-magnetism, he will find it a very difficult task to expect men of science to believe for a moment that his proposed method for developing motive power is not subject to the above law.

At page 414, Dr. Meschin says, "The proposed electric gas engine and electric gas gun are original ideas." Dating from Chancery-lane, it is a wonder the writer has never thought of taking a two minutes' walk just to look into that repository of "original ideas," the Patent-office. If he had done so, he would have had little trouble in finding out that his ideas have been embodied in many patents, some nearly ten years old; there is one as long since as 1840, which I think will be found nearly akin to it; but as the office is open to all, and all the patents connected with electricity, up to a recent date, are tabulated in a separate volume, so that any one interested in the matter can in five minutes see for himself, it is needless to be more explicit at present. I think it is No. 575, A.D. 1853, which looks very much like a perpetual motion machine, in which Grove's gas battery is transplanted from the philosophical laboratory (where it has been hitherto almost a scientific curiosity or toy) to the engine-room of the mechanic to supersede the steam engine. This proposed engine, if I recollect rightly, was referred to at the time with commendation, and in terms of large expectation, in "Timbs' Year-Book of Facts," a popular volume by an author of some repute, and therefore it is the more to be regretted that some wild schemes are annually chronicled by it as "facts" without apparently the slightest discrimination as to their usefulness or even practicability.

I am, &c.,

W. SYMONS, F.C.S.

17, St. Mark's-crescent, 10th June, 1862.

RECREATION IN MECHANICS' INSTITUTES.

SIR,—If Institutes designed especially for working men are to prove really efficient in influencing for good the great majority of our industrious population, the provision of amusement for leisure hours and occasional holidays must form an element, and that not the least in their operations. Relaxation from the toils of labour may differ in kind and in degree, according to the nature of the employment and its ordinary effects upon the bodily frame, but in almost every case something is required which may be characterised and felt as real enjoyment, and much will depend upon the mode in which it is carried out, for its influence proving beneficial or otherwise. One of the strongest objections to the early closing movement was the belief—perhaps too well founded—that many would occupy the coveted leisure in dissipation and intemperance, whilst the demand for occasional public holidays, in order to lessen the desecration of the Lord's Day, was met by a similar objection.

If, however, the managers of the Mechanics' Institutes were to devote their serious attention to the best means of rendering such intervals really profitable, not only would such objections be removed, but the arguments in favour of occasional public holidays would be materially strengthened. The men have by their labour acquired the right to spend the wages of their industry, and while they will execute this right according to their own will, it more often depends upon the judicious guidance of others, and the systematic organisation of a local Institute, whether the recreation shall prove a bane or a blessing. As most

Institutions are at present constituted, they offer the instruction to be afforded by classes, library, reading-room, or lectures, and if these be not appreciated, which by the majority they are not, the working classes are at once condemned for being insensible to all attempts for their mental and moral improvement. The charge may be true to a certain extent, but it is too often owing to the little endeavour which has been made to give the amusements of our working people a profitable direction.

In country towns during the summer months much good may be done by having a cricket club as a part of the Institution, the bats, balls, &c., being provided, and proper order as well as attendance, to give interest to the game, being secured by rules. In places near a broad river, rowing forms a healthful recreation, and small prizes may occasionally be awarded to the successful in competition. In other places—for much will depend upon the nature of the locality—there may be foot-races and athletic sports such as Englishmen delight in, and if under the auspices of the Institute, small fines might be levied for foul language and other intemperate conduct.

It is, however, in the long evenings of winter, when the public-house proves the strong temptation to so many, that a counter-attraction is the most needed. It is then that the Institute should strive the most to bring all within its influence, and by adapting its offered advantages to the feelings and inclinations of those whom it seeks to collect within its walls, obtain that appreciation the absence of which is now so much lamented. In the North of England especially, and in most other parts, music, both instrumental and vocal, rarely fails to prove attractive; and whilst much advantage is gained from large numbers, the working-man has only the public-house concert unless the Institute provides a similar entertainment.

It is gratifying to observe, from the letter of Mr. Jones, of Dudley, that some attempts in this direction have been made amongst the numerous population engaged in the collieries and iron-works of South Staffordshire, and that so far they have proved successful. It is by such persons that relaxation is most needed, their labour being exhaustive of their physical energies; but there are many others, with less excuse for such indulgence, who can only be influenced by similar means. But even entertainments ostensibly and chiefly for amusement need not be entirely so. The glee, or the chorus, or the song, or the overture, may alternate with the reading of something more instructive, and the word in season may often be productive of future fruits though immediate results may not be always apparent.

It may be argued, as it has often been, that Mechanics' Institutes are for the promotion of literature and science, and that the encouragement of mere amusement is beyond their province as well as a lowering of their character. This may be true, but on the other hand, if learning and its manifold advantages have no charms for the working man for whom the means of self-improvement have been provided, is it not true wisdom, if the end sought be the improvement of the uninstructed, the teaching of the untaught, to seek it by the best means that may be attainable? The working man, however ignorant, or oblivious of his own good, is a free agent, and if he will not be tempted within the walls of the Institute by the useful which has been provided, it is certainly deserving of consideration whether, by the more attractive nature of the advantages offered, he may not be gained to take the first step to his moral amelioration by forsaking the public-house.

If our working population were once brought within the influence of the Institute by inducements to become members, many opportunities might be found for improving the acquaintance. In the society of better informed men, ignorance might become ashamed of its own inferiority, and be stimulated to better aspirations. It is in the company of their equals or inferiors that men fail to acquire any desire to become better, but as even cowards fight courageously in brave company, so intellectually the same

spirit to emulate their fellows may be excited if they are brought in association within the Institute, where mental cultivation has ostensibly a prominent place.

Let me hope that this subject may be still further elucidated at the approaching Conference at the Society of Arts.

I am, &c.,

BARNETT BLAKE.

Leeds, 7th June, 1862.

THE PATENT LAW.

SIR,—I was much pleased to see the letter on this subject by Mr. Campin, inserted in the *Journal* for May 16th, page 444, because it confirms or corroborates every position assumed by me in regard to the law of patent right, and I only beg a small space in order to point out one or two errors which I find in that gentleman's communication.

It may possibly be the case, as Mr. Campin asserts, that Sir W. Armstrong found out the same thing, that is to say, a mode of manufacturing heavy ordnance with wrought iron, for which Sir William obtained a patent in 1858; but it should be observed that the same process was described and published by me in this *Journal*, in the number for December 15th, 1854, some three or four years before the date of Armstrong's patent.

Mr. Campin is in error when he supposes that Government had forgotten my invention, which was laid before the Board of Ordnance in January, 1856, because from that date to the present time, there has been a constant correspondence kept up on this subject between the Board of Ordnance, the War Office, and myself; and I have a petition now lying before Parliament praying for acknowledgment or compensation for the injury I have sustained.

Mr. Campin further presumes, very erroneously, that I could not stand any amount of "badgering" from Government officials. What I could not stand was the risk and expense of a patent right lottery ticket, or, still less, that of constructing, at my own proper cost and charge, a full-sized ten-inch piece of ordnance for trial and proof by the experimental committee of the Royal Arsenal at Woolwich.

Finally, I beg to say that I did acquire *status* by laying the whole process before the Ordnance Select Committee, in whose possession the plans and process still remain.

I am, &c.,

HENRY W. REVELEY.

Parkstone, Poole, Dorset.

MEETINGS FOR THE ENSUING WEEK.

MON.....British Architects, 8.

TUES.Statistical, 8. 1. The Rev. Edward Gillett, "A Plan for the Collection of Agricultural Statistics." 2. Mr. Jno. Glover, "On the Statistics of Tonnage during the first decade under the Navigation Law of 1849." Architectural Museum, South Kensington, 8. The Rev. Thomas James, M.A., "On Labourers' Cottages and their bearing upon Architecture."

Ethnological, 8. 1. Mr. John Crawford, "On Colour as a test of Race." 2. Mr. R. S. Poole, "On Egyptian Ethnology."

WED.Meteorological 7. Annual Meeting.

Geological, 8. 1. Professor J. B. Jukes, "On the Mode of Formation of some of the River-valleys of the South of Ireland. 2. Rev. Professor S. Haughton, "On the Granites of Donegal." 3. Mr. E. W. Binney, "On the Upper Coal-measures of Ayrshire." 4. Professor James Nicol, "On the Geological Structure of the Southern Grampians." 5. Mr. S. H. Beckles, "On some Footprints in the Wealden of the Isle of Wight, Hastings, and Swanage." 6. Professor T. R. Huxley, "On a Stalk-eyed Crustacean from the Coal-measures."

THURS.Royal, 8½.

Antiquaries, 8½.

Linnæan, 8.

Chemical, 8.

Numismatic, 7. Annual Meeting.

Philosophical Club, 6.

FRI.Royal Inst., 8. Professor Faraday, "On Gas Glass Furnaces, etc."

R. Horticultural Soc., 2.

SAT.Asiatic, 3.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on May, 15th 1862.

- Par Numb.
186. Schools—Returns.
204. Coals (Woolwich and Portsmouth)—Return.
220. Public Accounts—First Report from Committee.
227. Navy (Pursers)—Return.
111. Bills—Crown Private Estates.
113. " Universities (Scotland) Act Amendment.
114. " Local Government Supplemental.
115. " Elections for Counties (Ireland).
116. " Elections (Ireland).
117. " Public Houses (Scotland) (as amended in Committee, and on re-commitment).
Rebellion in China, and Trade in the Yang-Tze-Kiang River—Maps.

Delivered on 16th May, 1862.

228. Ecclesiastical Commission (Ireland)—Annual Report and Account.
236. Government Property—Return.

Copies of the undermentioned Papers, presented by Command, will be delivered to Members of Parliament applying for the same at the Office for the Sale of Parliamentary Papers, House of Commons:—

30. Poor Relief (Ireland)—Annual Report.
31. Charitable Donations and Bequests (Ireland)—Seventeenth Report.
32. Convict Prisons (Ireland)—Eighth Report.
33. Turnpike Trusts—General Report from Secretary of State.

Delivered on 17th and 19th May, 1862.

232. Tyrone Assizes (Jury Panel)—Return.
210. Canada (Halifax, &c. Railway)—Copy of Official Communications, &c.
240. Metropolis Local Management Act—Return.
250. Civil Services—Supplementary Estimate (Class 4).
251. Civil Services—Supplementary Estimate (Class 5).
47. Bills—Fisheries (Ireland).
121. " Universities (Scotland) Act Amendment (No. 2).
122. " County Surveyors (Ireland).
Occupation of Lagos—Papers.

Delivered on 20th May, 1862.

213. Exchequer—Account.
221. Fires in the Metropolis—Report and Evidence.
239. Longford County Election—Returns.

Delivered on 21st May, 1862.

61. Local Acts—Admiralty Report.
235. Metropolis Turnpike Roads—Thirty-sixth Report of the Commissioners.
242. Queen's Colleges (Ireland)—Returns.
243. Limerick Mail—Copy of Correspondence.
253. Army (Cast Horses)—Return.
254. Military Survey (London)—Return.
160. Sewage of Towns—First Report from Committee.
119. Bills—Salmon Fisheries (Scotland) (amended).
123. " Education of Pauper Children (amended by the Select Committee).

Delivered on 22nd May, 1862.

226. Highways Bill—Minutes of the Proceedings of the Select Committee.
234. Galle Harbour (Ceylon)—Return.
246. Tea, Coffee, &c.—Return.
247. Sugar Duties—Copy of a Memorial.
252. Civil Services—Supplementary Estimate (Class 7).
215. East India (Paper Money)—Return.
120. Bills—Lunacy (Scotland) (amended).
124. " Unlawful Oaths (Ireland) Act Continuance.
France—Convention relative to Joint Stock Companies.

Delivered on 23rd May, 1862.

230. East India (Covenanted Civilians)—Return.
238. Tobacco—Return.
241. Queen's Colleges (Ireland)—Return.
127. Bills—Artillery Ranges.
128. " Sandhurst Vesting.
129. " Jurisdiction in Homicides.
130. " Inclosure (as amended by the Select Committee.)
United States of America—Treaty for the Suppression of the African Slave Trade.
Education—Minute of the Committee of Council confirming the Alterations of the Revised Code of Regulations.

SESSION 1861.

- 324 (C.) Poor Rates and Pauperism—Return (C).

Delivered on 24th and 26th May, 1862.

248. Industrial Schools—Returns.
262. Navy—Return.
264. Royal Dublin Society—Return.
265. Railway and Canal Bills—Seventh Report from the General Committee.
267. Church Building Acts, &c.—Return.
214. East India (Sikkim Expedition)—Return.
266. East India Communication—Report from Committee.

126. Bills—Partnership Law Amendment.
 134. „ Rifle Volunteer Grounds Act (1860) Amendment.
 86. „ Juries.
 Public General Acts—Caps. 12, 13, 14, 15, 16, 17, 18, 19, 20 and 21.

Delivered on 27th May, 1862.

260. Licensed Trades and Professions—Return.
 261. Military Reserve Fund—Account.
 269. Pier and Harbour Act—Report of the Board of Trade.
 132. Bill—Clergy Relief (as amended by the Select Committee).
 Mexico—Correspondence (Part 2).

Delivered on 28th May, 1862.

229. Railways—Return.
 258. Landed Estates Court (Dublin)—Return.
 263. East India (Bengal Army)—Return.
 268. Children in Workhouses—Return.
 277. Spithead Forts—Paper.
 125. Bills—Tralee Savings Bank.
 135. „ Highways (as amended by the Select Committee, and in Committee.)

Delivered on 29th May 1862.

272. Militia (Ireland)—Returns.
 273. Holyhead and Kingstown Mails—Return.
 275. East India (Military Letter)—Return.
 133. Bills—Police and Improvement (Scotland) (amended).
 136. „ Merchant Shipping Acts, &c. Amendment (amended in Committee, and on re-commitment).
 138. „ Police (Counties and Boroughs).

Delivered on 30th May, 1862.

256. Canada (Mr. Ryland's Claims)—Return.
 276. National Defences—Return.
 139. Bill—Salmon Fisheries (Scotland) (as amended in Committee, and on re-commitment.)
 North America—Despatch from Lord Lyons respecting the Reciprocal Treaty (No. 10).
 China—Further Papers relating to the Rebellion.

Delivered on 31st May and 2nd June, 1862.

- 43 (A.) Trade and Navigation Accounts (30th April, 1862.)
 274. Trade of Certain Ports—Accounts.
 278. Lunacy—Return.
 280. Middle Level Drainage—Return.
 283. Railway and Canal Bills—Eighth Report from the General Committee.
 190. Wine—Return.
 257. Transatlantic Steamers—Return.
 218. Railway and Canal Bills—Ninth Report from the General Committee.
 291. Army, &c.—Account of Receipts and Expenditure.
 294. Public Expenditure—Returns.
 118. Bill—Tramways.

Delivered on 3rd June, 1862.

30. Railway and Canal Bills (154. Kent Coast Railway)—Board of Trade Report.
 284. Vessels and Tonnage, &c.—Return.
 212. Trade Marks Bill and Merchandise Marks Bill—Report from Committee.
 233. Prisons—Return.
 244. East India (Finance and Revenue Accounts)—Paper.
 137. Bills—Companies, &c. (amended).
 142. „ Ballot.
 143. „ Naval and Victualling Stores.
 144. Parochial Assessments (as amended by the Select Committee).
 Denmark (Surrender of Prisoners)—Convention.
 France (Naval and Military Forces—Copy of Reports.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, June 6th, 1862.]

- Dated 17th April, 1862.*
 1116. A. Krupp, Essen, Prussia—Certain imp. in the manufacture of screw propellers.
Dated 29th April, 1862.
 1247. J. W. Caley and F. G. Caley, New Windsor—An improved textile fabric.

Dated 2nd May, 1862.

1299. R. A. Brooman, 166, Fleet-street—Imp. in apparatus for super-heating steam. (A com.)

Dated 9th May, 1862.

1387. G. F. Greiner and J. H. C. Sandilands, 1, Golden-square—Imp. in the construction of pianofortes.
 1388. T. McIlroy, 260, Oxford-street—An improved invalid bedstead.
 1391. W. Eddington, jun., Chelmsford, Essex—Imp. in portable grinding, chaff-cutting, and corn-crushing machinery.
 1392. F. F. B. Mayall, Warrington, Lancashire—Imp. in dyeing mixed or plain fabrics and yarns.

Dated 13th May, 1862.

1443. W. Clark, 53, Chancery-lane—Imp. in apparatus for generating motion in fluids, applicable for raising and forcing water, propelling and otherwise in the distribution of motive power. (A com.)

Dated 14th May, 1862.

1451. H. C. R. Joubert, 18, Maddox-street—Imp. in raising music chairs, stools, or seats.

Dated 16th May, 1862.

1486. F. B. Anderson, Birmingham—Imp. in watches and other time keepers.

Dated 19th May, 1862.

1512. F. C. Kirkman, Crouch-end, Hornsey, and R. Swift, Hounslow—A new and improved joint for uniting or fixing posts and rails of bedsteads and other articles of furniture, posts, and rails in fencing, in the construction of framework for conservatories, emigrants and other portable houses.

Dated 22nd May, 1862.

1542. E. De la Bastida, 43, Hart-street, Bloomsbury-square—A new process for the production of designs in relievo, and in deepening on sheets of india-rubber of any length whatever. (A com.)

1544. J. Needham, Piccadilly—Imp. in breech-loading fire-arms, and in cartridges for such fire-arms.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1646. J. Betteley, Liverpool—Imp. in ship building, and in rendering ships shot proof.—31st May, 1862.

PATENTS SEALED.

[From Gazette, June 6th, 1862.]

- | | |
|------------------------|---------------------------------|
| <i>June 6th.</i> | 3118. A. Tonnar. |
| 3083. R. A. Booman. | 3129. J. W. Friend. |
| 3087. W. Clark. | 3133. P. Quantin. |
| 3093. J. A. J. Reider. | 3137. H. Appleby & H. Harrison. |
| 3099. D. Vogl. | 3245. J. McIntyre. |
| 3109. J. Potter. | 339. A. V. Newton. |
| 3110. J. Leeming. | 841. W. L. Winans. |
| 3113. W. Lightfoot. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, June 10th, 1862.]

- | | |
|--|---|
| <i>June 2nd.</i> | 1407. M. J. Haines. |
| 1354. S. Wood, J. Wood, and P. Billington. | 1425. A. Smith. |
| <i>June 4th.</i> | 1431. W. Brown and S. Bathgate. |
| 1383. J. Ferrabee. | <i>June 6th.</i> |
| 1466. J. Combe and R. Smalpage. | 1423. H. L. Corlett. |
| <i>June 5th.</i> | <i>June 7th.</i> |
| 1384. W. Green. | 1394. J. Henderson, W. Henderson, T. Bagley, and S. Holdsworth. |
| 1400. A. V. Newton. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, June 10th, 1862.]

- | | |
|----------------------|---|
| <i>June 3rd.</i> | 1318. C. F. Varley. |
| 1274. G. Green. | <i>June 6th.</i> |
| <i>June 5th.</i> | 1315. J. S. Nettlefold, E. J. Nettlefold, and J. H. Nettlefold. |
| 1292. G. Hopper. | |
| 1294. J. Robertson. | 1321. J. Robinson. |
| 1299. J. Ramsbottom. | |
| 1300. J. Buncle. | |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4483	May 17.	New or Improved Target for Percussion Cap Practice	Richard George Coles	Fleetwood.
4484	June 3.	A Compound Protractor	{ Commander Hay, R.N., & } { J. R. Stebbing, F.R.A.S. }	Southampton.
4485	„ 4.	A Compound Collar and Cravat, to be called the "Olympic."	Robt Furness and Ed. Furness.	11, Trump-street, City, E.C

Journal of the Society of Arts.

FRIDAY, JUNE 20, 1862.

INTERNATIONAL EXHIBITION OF 1862.

SEASON TICKETS.

Members of the Society and others are informed that Season Tickets may be obtained at the Society's house, on application to Mr. S. T. Davenport, the financial officer. Price three guineas and five guineas, the latter also admitting to the Horticultural Gardens and *fetes* during the season.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £451,900, have been attached to the Deed.

ELEVENTH ANNUAL CONFERENCE.— NOTICE TO INSTITUTIONS.

The Eleventh Annual Conference between the Representatives of the Institutions in Union and the Council, will be held on Monday next, the 23rd inst., at 12 o'clock, noon. Sir Thomas Phillips, Chairman of the Council, will preside.

The Chairmen of, or Representatives from, the Local Boards of Examiners are also invited to attend.

ANNUAL DINNER.

The One Hundred and Eighth Anniversary Dinner of the Society will take place in the Refreshment Room over the Central Entrance from the International Exhibition Building to the Horticultural Gardens, on Tuesday next, the 24th inst., at half-past five for six o'clock punctually. The Right Hon. W. E. Gladstone, M.P., will preside.

Applications for tickets (price fifteen shillings each) should be made to Mr. S. T. Davenport, at the Society's House. The company will assemble in the gallery over the Russian Court, near the entrance to the dining-rooms, at half-past five o'clock.

ANNUAL GENERAL MEETING.

The One Hundred and Eighth Annual General Meeting, for the purpose of receiving the Council's Report, and the Treasurer's Statement

of the Receipts, Payments, and Expenditure during the past year, and also for the Election of Officers, will be held (in accordance with the Bye-laws) on Wednesday next, the 25th of June, at 4 o'clock, p.m.

The Council hereby convene a Special General Meeting of the Members of this Society, to ballot for the Election of Members, such meeting to take place at the close of the Annual General Meeting.

By order,
P. LE NEVE FOSTER, *Secretary*.

CONVERSAZIONI.

The second and third Conversazioni of the present season will be held at the South Kensington Museum, on the 9th of July and the 8th of October.

THE INTERNATIONAL EXHIBITION AND THE FEMALE SCHOOLS OF ART.

The following circular has been issued to the Schools of Art throughout the United Kingdom:—

Science and Art Department of the Committee of Council on Education, South Kensington, London, W.
June 13th, 1862.

SIR,—Colonel the Hon. Sir C. Phipps has written to inform me that it is the intention of her Majesty the Queen to grant to a certain number of the female students in the Schools of Art throughout the United Kingdom free admission to the International Exhibition, upon two days, when the cost of admission is half-a-crown.

The number of students to be so admitted is fixed at 800, and Mr. Redgrave and myself have been requested to suggest for her Majesty's consideration the regulations under which the Queen's gracious intentions could be most beneficially and usefully carried out. In the distribution of these tickets, it would be her Majesty's wish that the merits of the pupils as students, as well as their station in life, should be duly considered.

I have therefore to request that, after conference with the Head Master, you will be so good as to fill up the accompanying form, and return it to me at your earliest convenience, so as to enable Mr. Redgrave and myself to submit the regulations which appear desirable.

It will be right to explain that in order to enable the student to obtain the ticket, she will have to present herself at the Science and Art Department at South Kensington, and the ticket will be available, by permission of Her Majesty's Commissioners, for any Friday or Saturday.

It will rest with the committee or the student to make the necessary arrangements for coming up to London, staying there, and returning.

I am, &c.,

HENRY COLE, *Secretary*.

FINANCIAL STATEMENT.

The following Statement (see next page) is published in this week's *Journal*, in accordance with Sec. 42 of the Society's Bye Laws, which provides that at the Annual General Meeting "the Council shall render to the Society a full account of all their proceedings, with a statement of the Receipts, Payments, and Expenditure during the past year; and a copy of such Statement shall be published in the *Journal* of the Society on the Friday before such General Meeting."

ANNUAL STATEMENT OF RECEIPTS, PAYMENTS, AND EXPENDITURE FOR THE YEAR
ENDING 31st MAY, 1862.

Dr.				Cr.			
To Subscriptions for the year :—				By General Establishment Expenses :—			
From Members and Institutions in Union	£	s. d.	£ s. d.	Rent, Rates, and Taxes	£	s. d.	£ s. d.
with the Society	...	...	5,384 12 6	Insurance, Gas, Coals, and House Charges.	188 4 6		
Outstanding	...	...	1,079 16 0	Salaries, Wages, and Commissions	280 12 4		
Estimated available arrears	...	...	864 16 0	Postage Stamps and Carriage of Parcels...	1,333 10 8		
Life contributions	...	...	900 18 0	Stationery & Printing (exclusive of Journal)	220 14 10		
				Advertising	310 12 9		
					11 13 6		
To Dividends on Stock :—				By General Expenditure :—	2,345 8 7		
£6,530 18s. Consols	...	...	168 8 11	Working Classes Museum	93 11 1		
£388 1s. 4d. New Three per Cents.	...	...	11 4 2	Library...	41 1 4		
Rs. 52,000 Indian 5 per Cent. Promissory	...	...		Journal...	£1,162 2 3		
Notes...	...	...	129 0 0	Less charged to Union of In-			
			308 13 1	stitutions	100 0 0		
To Sale of Books, Pamphlets, &c. :—					1,062 2 3		
Per Bell and Daldy	...	...	32 6 6	Union of Institutions (including Journal,			
Sale of catalogues, books, &c., at Society...	...	...	10 11 0	List of Lecturers, Examinations, Postage,			
			42 17 6	Stationery, Printing, &c.)	670 12 5		
Repayment on account of expenditure on				Central Committee of Educational Unions.	5 19 6		
Exhibition of 1862	...	...	939 2 6	Examination Prizes (Prince Consort's Prize)	26 5 0		
To Special Subscriptions held in trust :—				" (General) estimated at	143 0 0		
Examination Prize Fund :—				" (Special)	45 5 0		
The Prince Consort's Prize	...	...	26 5 0	Medals	12 12 0		
For Special Prizes received	...	...	13 8 0	Exhibition of 1862	16 17 6		
" outstanding	...	...	31 17 0	" Inventions	0 11 6		
" General Prizes received	...	...	17 17 0	Artistic Copyright Committee	9 14 10		
			89 7 0	Surgical Instrument do.	0 15 0		
Interest by London and Westminster Bank...	...	...	3 7 0	Musical Pitch do.	0 16 8		
Fees Paid by Local Boards	...	...	6 10 0	Deputation to, and Reports on, the Ex-			
			9 17 0	hibition at Florence	164 1 5		
South Australian Institute	...	...	150 0 0	Two Conversazioni at South Kensington...	294 13 4		
Maitland School of Arts	...	...	100 0 0	Dinner	23 4 2		
To Bequest under the Will of the late Dr.				Repairs and Alterations	42 0 5		
T. E. Cantor	...	...	5,042 0 0		2,653 3 5		
				By Special Expenditure :—			
			£13,832 3 7	South Australian Institute	169 19 3		
				Maitland School of Arts	110 17 5		
				Donation to the National Memorial to the			
				Prince Consort	1,050 0 0		
				" Mosaic Fund Committee	105 0 0		
				" Painter Stainers' Company	10 10 0		
				Legacy Duty	3 13 6		
				Annuity to Mrs. Cantor	62 10 0		
				Interest	2 13 8		
					1,515 3 10		
				By Excess of Income over Expenditure :—	6,513 15 10		
				By Purchase of Stock :—			
				£1,394 14s. 2d. Consols (including broker-			
				age, &c.)	1,250 0 0		
				Rs. 52,000 Indian 5 per cent. Promissory			
				Notes (including interest, brokerage, &c.)	5,404 12 2		
				Balance of Income not Invested	663 15 7		
					7,318 7 9		
					£13,832 3 7		

BALANCE SHEET, 31st MAY, 1862.

Dr.				Cr.			
To Sundry Creditors, viz. :—				By Cash in Hand :—			
To Tradesmen's Bills	£	s. d.	£ s. d.	At Messrs. Coutts and Co.	£	s. d.	£ s. d.
Fees to Examiners	...	...	520 1 7	At the London and Westminster Bank,	590 4 5		
The Prince Consort's Prize (Examinations)	...	...	189 0 0	available for Examination Prizes	31 5 0		
Examination Prizes to be Awarded by				In the hands of the Secretary	2 5 7		
the Society...	...	...	143 0 0	" Financial Officer	1 8 6		
Examination Prizes to be Awarded by					625 3 6		
the Society...	...	...	45 5 0	By the Prince Consort's Prize	26 5 0		
Salaries and Commissions	...	...	23 4 1	Sundry Contributors	31 17 0		
			946 15 8	Central Committee of Educational Unions	5 19 6		
To Economic Museum	...	...	83 11 5	Her Majesty's Commissioners of the Exhi-			
South Australian Institute	...	...	32 18 8	bition of 1862	15 0 0		
Sir Walter C. Trevelyan, Bart.	...	...	70 0 0	The Maitland School of Arts	10 17 5		
To Trust Liability in respect of Government				Subscriptions in Arrear	£1,079 16		
Stock (Consols) held for specific purposes,				Estimated not recoverable to			
as per contra, viz. :—				the Amount of	215 0		
Swinney Prize...	...	...	1,333 6 8		864 16 0		
Stock Trust	...	...	100 0 0		954 14 11		
To Government Stock New 3 per Cents., set				By Consols £5,097 11s. 4d., at 93½	4,766 3 3		
apart to answer Fothergill Trust...	...	...	388 1 4	Rs. 52,000 Indian 5 per Cent. Promissory			
				Notes at 103	5,356 0 0		
					10,122 3 3		
				By Cash at the London and Westminster			
				Bank, held in trust for Sir Walter C.			
				Trevelyan, Bt., to be awarded as a Prize.	70 0 0		
				By Government Stock, held in trust, appli-			
				cable to specific purposes, viz. :—			
				Consols	1,433 6 8		
				New 3 per Cents.	388 1 4		
By excess of Assets over Liabilities			1,063 5 9				
			10,638 15 11				
			£11,702 1 8				

Society's House, Adelphi,
June 18, 1862.

(Signed)

JOHN ALGER,
W. B. SIMPSON,
P. LE NEVE FOSTER,

Auditors.
Secretary.

EXAMINATIONS, 1862.
PRIZES AND CERTIFICATES AWARDED TO CANDIDATES.

PRIZES.

HIS ROYAL HIGHNESS THE PRINCE CONSORT'S PRIZE OF TWENTY-FIVE GUINEAS, TO

80. John Gershom Greenhough, aged 19, Bradford Mechanics' Institute—Merchant's Clerk, who has obtained the following First Class Certificates:—

1859. Arithmetic—First-class Certificate.
1860. English History—First-class Certificate.
„ Geography—First-class Certificate.
1861. English Literature—First class Certificate.
1862. Algebra—First-class Certificate.
„ Geometry—First-class Certificate (with First Prize).

Arithmetic ...	1st Prize	£5	To No. 680—William Dean, aged 22, Working Men's College, Wolverhampton—Railway Clerk
	2nd Prize	3	„ 738—Job Genner, aged 22, Messrs. Chances' Library and Reading Room, Birmingham—Clerk
Book-keeping	1st Prize	5	„ 410—Archibald Simon Lang Macdonald, aged 22, London Mechanics' Institution—Clerk
	2nd Prize	3	„ 815—James MacCallum Cherry, aged 22, Glasgow Institution—Clerk
Algebra	1st Prize	5	„ 174—Henry George White, aged 20, Devonport Mechanics' Institute—Shipwright Apprentice
	2nd Prize	3	„ 680—William Dean, aged 22, Working Men's College, Wolverhampton—Railway Clerk
Geometry ...	1st Prize	5	„ 80—John Gershom Greenhough, Bradford Mechanics' Institute—Merchant's Clerk
	2nd Prize	3	„ 304—Henry George Hills, aged 19, Hertford Literary and Scientific Institution—Printer
Mensuration..	1st Prize	5	„ 167—William John Bone, aged 18, Devonport Mechanics' Institute—Shipwright Apprentice.
	2nd Prize	3	„ 384—William Vaughan, aged 21, City of London College—Clerk
Trigonometry.....	.....	...	No Prizes Awarded.†
Conic Sections.....	.....	...	No Prizes Awarded.†
Navigation & Nautical Astronomy ...	.....	...	No Prizes Awarded.†
Principles of Mechanics...	.....	...	No Prizes Awarded.†
Practical Mechanics†.....	1st Prize	5	„ 924—George Russell, aged 22, Glasgow Mechanics' Institution—Mechanical Engineer
	2nd Prize	3	„ 410—Archibald Simon Lang Macdonald, aged 22, London Mechanics' Institution—Clerk
	3rd Prize§	2	„ 564—John Donaldson, aged 20, Newcastle-on-Tyne Mechanics' Institution—Engineer
Magnetism, Electricity, and Heat ...	1st Prize	5	„ 914—James Loudon, aged 33, Glasgow Mechanics' Institution—Tailor
	.....	...	No Second Prize Awarded.||
Astronomy ...	.....	...	No Prizes Awarded.†
	1st Prize	5	„ 266—Thomas Cook, aged 32, Popular Evening Classes, Andersonian University, Glasgow—Clerk
Chemistry ...	2nd Prize	3	„ 767—Benjamin Joseph B. Crampton, aged 18, Wigan Mechanics' Institution—Chemist and Druggist
	.....	...	No Prizes Awarded.†
Animal Physiology, in relation to health	1st Prize	5	„ 616—William Ferguson, aged 19, Richmond Young Men's Society—Gardener
	.....	...	No Second Prize Awarded.||
Botany.....	.....	...	No Prizes Awarded.†
Agriculture ...	1st Prize	5	„ 251—Alexander Crawford, aged 25, Popular Evening Classes, Andersonian University, Glasgow—Coal Miner
	2nd Prize	3	„ 286—Thomas Muir, aged 18, Popular Evening Classes, Andersonian University, Glasgow—Studying Colliery Management
Mining and Metallurgy ¶	.....	...

† No Candidate obtained a First-class Certificate in this subject.

‡ The Prizes of Books in this subject are not awarded, as no more Candidates obtained First-class Certificates.

§ Additional, by gift of the Rev. J. M. Prower.

¶ The Candidate standing second in this subject did not obtain a First-class Certificate.

¶ The other Prizes are not awarded as no more Candidates obtained First Class Certificates.

Political & Social Economy	.....	...	No Prizes Awarded.†
Domestic Economy	1st Prize	5	399—James Sutherland Symon, aged 26, London Mechanics' Institution—Clerk
	.....	...	No Second Prize Awarded.‡
	1st Prize	5	78—George Bearder, aged 28, Bradford Mechanics' Institute—Millwright
Geography	2nd Prize	3	458—Thomas Myers, aged 23, Leeds Young Men's Christian Association—Clerk
	1st Prize	5	192—John Allan, aged 23, Glasgow Athenæum—Clerk
	2nd Prize	3	132—Thomas Healey, aged 22, Burnley Mechanics' Institute—Book-keeper
English History	3rd Prize|| .....	2	872—James Wight, aged 16, Aberdeen Mechanics' Institution—Clerk
	Three Prizes of Books to the value of £1 each|| .....	1	135—John Whittaker, aged 16, Burnley Mechanics' Institute—Worker in Warehouse
	1st Prize	5	228—Robert Rintoul, aged 23, Glasgow Athenæum—Clerk
	2nd Prize	3	239—Andrew Young, aged 19, Glasgow Athenæum—Clerk
	3rd Prize|| .....	2	34—Elizabeth Fulford, aged 18, Birmingham and Midland Institute
English Literature §	Two Prizes of Books to the value of £1 each|| .....	1	192—John Allan, aged 23, Glasgow Athenæum—Clerk
	1st Prize	5	374—James Rigby Smith, aged 21, City of London College—Bootmaker
	2nd Prize	3	216—John Jackson, aged 21, Glasgow Athenæum—Tobacconist's Assistant
Logic & Mental Science...	1st Prize	5	964—Richard McCully, aged 21, Stourbridge Mechanics' Institution—Clerk
	2nd Prize	3	229—Robert Rodman, aged 17, Glasgow Athenæum—Clerk
Latin and Roman History.	1st Prize	5	216—John Jackson, aged 21, Glasgow Athenæum—Tobacconist's Assistant
	2nd Prize	3	968—George Boden, Stourbridge Mechanics' Institution—Reporter
French.....	1st Prize	5	356—John Jackson Clark, aged 16, City of London College—Clerk
	2nd Prize	3	348—James Staughton Harding, aged 22, City of London College—Clerk
German.....	.....	...	195—Robert James Bridge, aged 18, Glasgow Athenæum—Book-keeper.
Free hand Drawing	1st Prize	5	No Prizes Awarded.†
	2nd Prize	3	729—Isaac Holloway, aged 22, Messrs. Chance's Library, Birmingham—Glass Painter
Geometrical Drawing .....	.....	...	731—Thomas William Camm, aged 23, Messrs. Chance's Library, Birmingham—Draughtsman
Music	1st Prize	5	No Prizes Awarded.†
	2nd Prize	3	835—William Carling, aged 29, Hitchin Mechanics' Institute—Miller
			482—William Crosher, aged 24, Leicester Church of England Institute—Hosier

† No Candidate obtained a First-class Certificate in this subject.

‡ The Candidate standing second in this subject did not obtain a First-class Certificate.

|| Additional, by gift of Sir C. Wentworth Dilke, Bart.

§ The third Book prize is not awarded, as no more Candidates obtained First-class Certificates.

CERTIFICATES.

The following is an Alphabetical List of the Candidates who have obtained Certificates:—

(1st) after a subject signifies a First-class Certificate.

(2nd) " " Second-class "

(3rd) " " Third-class "

(The occupations stated are either present or proposed.)

No.

- 889—Abekromby, Andrew, aged 18, Aberdeen M.I., Clerk—Arithmetic (2nd)
 422—Albin, Juliette, aged 25, Polytechnic Institution—French (3rd)
 595—Alexander, William, aged 21, Paisley Artisans' Inst., Wright—Music (2nd)
 269—Allan, James, aged 18, Popular Evening Classes, Andersonian University, Glasgow, Clerk—Chemistry (2nd); Astronomy (2nd)
 192—Allan, John, aged 23, Glasgow Athenæum, Clerk—English History (1st) with 1st Prize; English Literature (1st) with 2nd Prize
 347—Allardice, Robert George, aged 23, City of London College, Commercial Clerk—Book-keeping (1st)
 165—Allen, George Edward, aged 22, Devonport M.I., Accountant—Book-keeping (1st)—Freehand Drawing (2nd)
 898—Anderson, James, aged 25, Glasgow M.I., Clerk—Geometry (3rd)
 663—Anderson, James, aged 40, People's College, Sheffield, Boot-maker—English History (1st)
 468—Andrew, Arthur, aged 16, Leeds M.I.—Arithmetic (2nd); English History (3rd); Algebra (1st).
 365—Andrewes, Thomas Lloyd Newton, aged 21, City of London College, Clerk—Arithmetic (3rd)
 376—Appleyard, Charles Henry, aged 25, City of London College, Commercial Traveller—French (2nd)
 830—Archer, Caleb, aged 21, Wellingborough M.I., Architect's Clerk—Arithmetic (1st)
 748—Armitage, John, aged 26, Wakefield M.I., Factory Overlooker—Bookkeeping (2nd)

- 277—Armour, Laurence Hill, aged 16, Popular Evening Classes, Andersonian University, Glasgow, Civil Engineer—Mensuration (3rd).
- 425—Ashmead, Edward, aged 28, Polytechnic Institution, Commercial Clerk—Bookkeeping (1st)
- 510—Ashton, Robert, aged 20, Manchester M.I., Warehouseman—Animal Physiology (2nd)
- 582—Ashton, William, aged 21, Henshaw-street Mutual Improvement Society, Oldham, Mechanic—English History (3rd); Geography (2nd)
- 560—Atkin, Isabella Lilley, aged 24, Newcastle-on-Tyne Lit. and Phil. Institution—English Literature (3rd)
- 406—Aumonier, Frederic, aged 24, London M.I., Salesman at Paper Stainers—French (2nd)
- 303—Aves, Samuel, aged 21, Hertford L. and S.I., Collector (for Gas Company)—Bookkeeping (1st)
- 848—Aylott, Sarah, aged 27, Teacher—Domestic Economy (2nd); Geography (2nd)
- 444—Bachelor, Peter, aged 16, St. Thomas Charterhouse Evening Classes, Clerk at Wesleyan Mission House—Arithmetic (3rd); Book-keeping (3rd); Algebra (3rd)
- 188—Bagley, William F. G., aged 20, Devonport M.I., Conveyancer's Clerk—Arithmetic (2nd); Book-keeping (1st)
- 863—Bailey, Frederick, aged 27, City of London College, Clerk—German (3rd)
- 885—Baker, William Hosier, aged 17, Aberdeen M.I., Clerk—French (2nd)
- 432—Baker, Wm. Henry, aged 18, St. Stephen's (Westminster) Evening School, Pupil Teacher—English History (3rd); Algebra (3rd); Geography (1st)
- 83—Baldwin, Bentley, aged 20, Bradford M.I., Warehouseman—English History (3rd)
- 864—Baine, Henry, aged 22, Halifax W.M.C., Woolsorter—Arithmetic (2nd); Book-keeping (1st)
- 353—Banister, Arthur, aged 16, City of London College, Clerk—Arithmetic (2nd)
- 92—Barber, John, aged 31, Bristol Athenæum, Dispenser—Chemistry (2nd)
- 941—Barrowman, William, aged 16, Popular Evening Classes, Andersonian University, Glasgow, Studying Colliery Management—Mining and Metallurgy (2nd)
- 181—Bartlett, Charles Marshall, aged 28, Devonport M.I., Smith—Book-keeping (1st); Geometrical Drawing (2nd) Free-hand Drawing (3rd)
- 522—Barry, William Thomas, aged 18, Manchester M.I., Warehouseman—Arithmetic (3rd)
- 45—Bastin, Edward Philp, aged 19, Birmingham and Midland Inst., Engineer—Algebra (2nd)
- 965—Bate, John, aged 21, Stourbridge M.I., Bricklayer—Arithmetic (2nd); Algebra (2nd)
- 324—Batt, Tom, aged 16, Leeds Young Men's Christian Association, Clerk—Book-keeping (1st)
- 636—Battersby, Thomas, aged 21, Salford Working Men's College, Clerk—Book-keeping (1st)
- 687—Battle, Hugh, aged 41, Missionary—Arithmetic (1st); Principles of Mechanics (3rd)
- 515—Baxter David, aged 25, Manchester M.I., Clerk—Animal Physiology (2nd)
- 78—Bearder, George, aged 28, Bradford M.I., Millwright—Arithmetic (2nd); Book-keeping (2nd); Practical Mechanics (3rd); Geography (1st) with 1st Prize.
- 848—Beck, William John, aged 20, Deptford, Assistant Master—Arithmetic (2nd)
- 452—Bedford, Charles, aged 19, Leeds Young Men's Christian Association, Mechanic—Algebra (1st); Mensuration (2nd); Trigonometry (3rd)
- 724—Bellingham, Benjamin, aged 18, Wednesbury M.I., Clerk—Arithmetic (3rd)
- 341—Bennett, Robert Christopher, aged 19, City of London College, Clerk—Book-keeping (1st)
- 818—Bennie, James, aged 27, Glasgow Institution—Latin and Roman History (2nd)
- 336—Benson, George, aged 22, City of London College, Submarine Telegraph Clerk—English History (3rd)
- 620—Bensted, William Allen, aged 17, Richmond Parochial Reading Room and Library, Clerk—English History (3rd)
- 588—Berry, William, aged 22, Henshaw-street Mutual Improvement Society, Oldham, Warehouseman—Book-keeping (3rd)
- 198—Betty, Andrew George, aged 21, Glasgow Athenæum, Inland Revenue Office—English Literature (3rd)
- 951—Bewers, William, aged 18, Chelmsford L. and M.I., Clerk to Corn Merchant—Geography (2nd)
- 163—Bird, Robert George, aged 17, Devonport M.I., Student—Geography (2nd)
- 272—Bishop, Thomas George, aged 16, Popular Evening Classes, Andersonian University, Glasgow, Merchant's Clerk—Free-hand Drawing (3rd)
- 549—Black, James Osborne, aged 39, Middlesborough M.I., Baker—Chemistry (2nd)
- 806—Black, John, aged 16, Glasgow Institution, Warehouseman—Arithmetic (3rd); Logic and Mental Science (3rd)
- 537—Blagg, William Thomas, aged 19, Manchester M.I., Lithographic Printer—Book-keeping (2nd)
- 194—Blake, Sophy Jex, aged 22, Glasgow Athenæum, Teacher of Arithmetic, &c.—Arithmetic (1st); Algebra (2nd)
- 310—Blakey, John, aged 18, Leeds Young Men's Christian Association, Clerk—Arithmetic (2nd)
- 776—Blanshard, William Noble, aged 17, York Inst., Attorney's Clerk—Arithmetic (3rd); Book-keeping (2nd)
- 972—Blunsom, William, aged 20, York Inst., Draper's Assistant—Algebra (3rd); Mensuration (3rd)
- 963—Boden, George, aged 21, Stourbridge M.I., Reporter—Latin and Roman History (1st) with 1st Prize
- 556—Bolingbroke, Marshall, aged 21, Newcastle-on-Tyne Church Institute, Certificated Schoolmaster—Arithmetic (2nd); Algebra (3rd); Mensuration (3rd); Music (2nd)
- 167—Bone, William John, aged 18, Devonport M.I., Shipwright's Apprentice—Arithmetic (1st); Algebra (2nd); Mensuration (1st) with 1st Prize
- 589—Booth, George, aged 21, Lees Literary and Scientific Institution, Book-keeper—Arithmetic (2nd)
- 708—Booth, Henry Clinton, aged 18, Bilston Inst., Pupil Teacher—English History (3rd)
- 68—Bottomley, Robert, aged 18, Bradford M.I., Warehouseman—Geometry (3rd)
- 635—Bottomley, Thomas, aged 20, Salford Working Men's College, Warehouseman—Book-keeping (1st)
- 462—Bradbury, Alfred Allen, aged 16, Leeds M.I., Pupil Teacher—Book-keeping (1st)
- 461—Bradbury, William Henry, aged 21, Leeds M.I., Cotton Spinner—Book-keeping (2nd)
- 838—Bradley, Wm. Jas., aged 19, West Hartlepool L. and M.I., Clerk—Book-keeping (1st)
- 359—Brady, James, aged 24, City of London College, Carpenter and Joiner—Arithmetic (1st)
- 710—Bragg, William Fletcher, aged 21, Bilston Inst., Grocer's Assistant—Arithmetic (3rd)
- 162—Braginton, William, aged 17, Devonport M.I., Pupil Teacher—Arithmetic (1st); English History (3rd); Geography (1st)
- 372—Brain, Herbert, aged 21, City of London College, Cashier—French (2nd)
- 659—Bramhall, John, aged 23, People's College, Sheffield, Usher—Arithmetic (3rd)
- 666—Bramwell, John Henry, aged 20, People's College, Sheffield, File Cutter—Arithmetic (3rd); French (2nd)
- 863—Brear, William, aged 18, Halifax W.M.C., Warehouseman—Book-keeping (1st); English Literature (2nd)

- 339—Brewer, Arthur Richard, aged 17, City of London College, Clerk—French (2nd)
 368—Brewis, John, aged 23, Newcastle-on-Tyne M.I., Grocer—Book-keeping (3rd)
 195—Bridge, Robert James, aged 18, Glasgow Athenæum, Book-keeper—French (1st) with 2nd Prize
 460—Briggs, William, aged 17, Leeds Church Inst., Pupil Teacher—Book-keeping (1st); Geography (2nd)
 457—Broadbent, James, aged 20, Leeds Church Inst., Warehouseman—Arithmetic (1st); English Literature (2nd); Geography (2nd)
 654—Brown, Enos, aged 21, People's College, Sheffield, Engraver—Arithmetic (3rd)
 133—Brown, Robert, aged 20, Burnley M.I., Weaver—Chemistry (2nd)
 725—Brown, Thomas, aged 29, Wednesbury M.I., Agent—French (1st)
 959—Brownhill, William, aged 18, Walsall W.M.C., Engineer and Machinist—Arithmetic (3rd)
 187—Browning, William Henry, aged 21, Devonport M.I., Art Pupil Teacher—Freehand Drawing (1st)
 139—Broxup, James, aged 20, Burnley M.I., Mechanic—Chemistry (2nd)
 245—Bryden, John, aged 26, Popular Evening Classes, Andersonian University, Glasgow, Coal Miner—Mining and Metallurgy (2nd)
 67—Buckle, Richard, aged 21, Bradford M.I., Teadealer's Assistant—Algebra (2nd)
 884—Bulloch, John, jun., aged 25, Aberdeen M.I., Clerk—Botany (3rd)
 875—Bulloch, William, aged 20, Aberdeen M.I., Clerk—French (2nd)
 840—Bunce, John Friend, aged 28, Canterbury Church of England Young Men's L.I., Turner—French (2nd)
 243—Burns, Robert, jun., aged 27, Popular Evening Classes, Andersonian University, Glasgow, Colliery Agent—Mining and Metallurgy (3rd)
 737—Burden, William Henry, aged 18, Messrs. Chance's Library, Smethwick, Clerk—Book-keeping (1st)
 500—Burgess, Martha, aged 37, Macclesfield Useful Knowledge Society, Housekeeper—Domestic Economy (2nd); French (3rd).
 418—Burrell, Frederick William, aged 21, Polytechnic Institution, Clerk—French (3rd)
 682—Butler, James Henry, aged 20, Wolverhampton W.M. Coll., Presser and Stamper—Mensuration (2nd)
 643—Butterworth, Joseph, aged 18, Selby M.I., Wheelwright—Book-keeping (1st)
 677—Caddick, James, aged 24, Wolverhampton W.M. Coll., Clerk—French (2nd)
 527—Cadley, George, aged 19, Manchester M.I., Boot-closer—Arithmetic (1st); Book-keeping (1st)
 731—Camm, Thomas William, aged 23, Messrs. Chance's Library, Smethwick, Draughtsman—Freehand Drawing (1st), with 2nd Prize.
 904—Campbell, Hugh, aged 17, Glasgow M.I., Warehouseman—French (3rd)
 338—Cannon, James, aged 22, City of London College, Clerk to Ship and Insurance Broker—Book-keeping (1st)
 10—Carley, Samuel, aged 16, Ashford, South Eastern Railway M.I., Railway Clerk—Arithmetic (1st)
 835—Carling, William, aged 29, Hitchin M.I., Miller—Music (1st) with 1st Prize.
 396—Carpenter, Joseph Marshall, aged 22, City of London College, Government Clerk—English History (2nd)
 657—Cartwright, William Rodgers, aged 20, People's College, Sheffield, Attorney's Clerk—Book-keeping (1st)
 966—Cave, William, aged 18, Stourbridge M.I.—Book-keeping (2nd)
 893—Chalmers, Jonathan, aged 21, Aberdeen M.I., Woollen Warehouseman—English History (2nd)
 660—Charlesworth, Samuel, aged 33, People's College, Sheffield, Merchant's Clerk—German (3rd); French (1st); Latin and Roman History (2nd)
 429—Chapple, Frederic, aged 16, St. Stephen's (Westminster) Evening School, Pupil Teacher—Arithmetic (1st)
 499—Chatterton, Thomas, aged 21, Louth M.I., Merchant's Clerk—Geography (2nd)
 470—Cheatter, Joseph, aged 24, Leeds West-end People's Inst., Solicitor's Clerk—Arithmetic (2nd); Book-keeping (1st)
 865—Chedzoy, Charles William, aged 18, Barnet Inst.—Book-keeping (1st)
 815—Cherry, James MacCallum, aged 22, Glasgow Inst., Clerk—Book-keeping (1st) with 2nd Prize; French (3rd)
 356—Clark, John Jackson, aged 16, City of London College, Commercial Clerk—Latin and Roman History (1st) with 2nd Prize
 200—Clark, Robert, aged 24, Glasgow Ath., Clerk—Arithmetic (1st); Book-keeping (1st); Animal Physiology (2nd)
 361—Clark, Walter Robert, aged 22, City of London College, Clerk—Arithmetic (2nd)
 779—Clarke, Edward, aged 18, York Inst.—Arithmetic (3rd)
 552—Clemiston, William, aged 20, Middlesbro' M.I., Engine Fitter—Arithmetic (3rd)
 322—Cliff, James, aged 19, Leeds Young Men's Christian Association, Warehouseman—Book-keeping (2nd)
 508—Clough, John, aged 22, Manchester M.I., Iron Turner—Mechanical Drawing (3rd)
 99—Collens, Edward, aged 19, Bristol Trade School, Draper's Apprentice—Chemistry (2nd)
 266—Cook, Thomas, aged 32, Pop. Ev. Classes, Andersonian Univ., Glasgow, Clerk—Chemistry (1st) with 1st Prize
 559—Cooke, Annie, aged 16, Newcastle-on-Tyne—Arithmetic (3rd); Domestic Economy (2nd)
 771—Coombe, Peter Alfred, aged 29, Pershore M.I., Solicitor's Clerk—Algebra (3rd)
 662—Cooper, Thomas, aged 19, People's College, Sheffield, Clerk—Arithmetic (3rd)
 46—Coote, Thomas, aged 17, Bishop's Stortford Literary Inst., Merchant's Clerk—Arithmetic (2nd)
 903—Cossar, John, aged 20, Glasgow M.I., Stationer's Assistant—Animal Physiology (3rd)
 331—Cousens, James Booty, aged 17, Greenwich Useful Knowledge Society, Land and Naval Surveyor—Algebra (2nd); Geometry (3rd)
 519—Cowburn, William Henry, aged 18, Manchester M.I., Clerk—Book-keeping (1st)
 147—Cowen, William, aged 19, Carlisle Church of England L.I., Clerk—Book-keeping (2nd)
 442—Cowlles, Alfred, aged 20, St. Thomas's Charterhouse Evening Classes, Clerk—Arithmetic (3rd)
 744—Cox, Henry, aged 18, Thirsk M.I., Pupil Teacher—Arithmetic (2nd); Geography (1st)
 97—Cozens, Joseph, aged 17, Bristol Young Men's Christian Association, Currier—Book-keeping (1st)
 438—Craig, Edward, aged 17, St. Stephen's (Westminster) Evening School, Railway Clerk—Arithmetic (2nd); Music (1st)
 901—Craig, James, aged 22, Glasgow M.I., Student—Arithmetic (2nd)
 767—Crampton, Benjamin Joseph B., aged 18, Wigan M.I., Chemist and Druggist—Chemistry (1st) with 2nd Prize
 251—Crawford, Alexander, aged 25, Pop. Evening Classes, Andersonian University, Glasgow, Coal Miner—Mining and Metallurgy (1st) with 1st Prize
 385—Crews, Henry George, aged 20, City of London College, Mercantile Clerk—Book-keeping (1st)

- 482—Crosher, William, aged 24, Leicester Church of England I., Hosier—Music (1st) with 2nd Prize
 48—Cross, Thomas Briggs, aged 21, Blackburn M.I. Book-keeper—Arithmetic (3rd)
 526—Cross, William Henry, aged 18, Manchester M.I., Under Salesman—Animal Physiology (3rd)
 449—Crossbie, William, aged 16, St. Thomas Charterhouse Evening Classes, Clerk—Arithmetic (3rd)
 296—Crossley, James Brierley, aged 20, Harrison-road Young Men's Society, Halifax, Clerk—Book-keeping (1st)
 749—Crossley, Joseph William, aged 20, Wakefield M.I., Dyer—Arithmetic (2nd); Book-keeping (2nd)
 274—Currie, David, jun., aged 22, Pop. Evening Classes, Andersonian University, Glasgow, Clerk—Magnetism, Electricity, and Heat (3rd)
 905—Dalglish, James C., aged 18, Glasgow M.I., Civil Engineer—Geometry (3rd)
 41—Dance, Joseph Henry, aged 19, Birmingham and Midland Institution, Brass Turner—Arithmetic (1st)
 203—Dansken, John, aged 26, Glasgow Athenæum, Measurer—Logic and Mental Science (1st)
 388—Dart, Richard Henry, aged 28, City of London College, Chemist—French (3rd)
 688—Dauncey, Henry, aged 29, Wolverhampton Young Men's Christian Institute, Printer (newspaper)—Animal Physiology (2nd)
 484—Davenport, James, aged 22, Lichfield Working Men's Association, Grocer—Arithmetic (2nd).
 498—Davidson, John, aged 19, Liverpool Institute, Clerk—Arithmetic (3rd)
 335—Davis, Charles Duroure, aged 19, Greenwich Useful Knowledge Society, Candidate for Government Clerkship—Arithmetic (1st); Book-keeping (1st); Algebra (1st)
 386—Day, Alfred, aged 21, City of London College, Cashier—Book-keeping (1st)
 427—Deadman, Manuel, aged 16, St. Stephen's (Westminster) Evening School, Pupil Teacher—Arithmetic (2nd)
 680—Dean, William, aged 22, Wolverhampton W. M. Coll., Railway Clerk—Arithmetic (1st) with 1st Prize; Algebra (1st) with 2nd Prize; Geometry (2nd)
 201—Dempster, James Keith, aged 24, Glasgow Athenæum, Draughtsman—Geometry (2nd)
 288—Denham, David, aged 20, Halifax M.I., Mercantile Clerk—French (2nd)
 156—Dent, John, aged 17, Darlington Church of England Inst., Clerk—Arithmetic (2nd)
 202—Dewar, Daniel, aged 18, Glasgow Athenæum, Assistant Teacher—Geometry (2nd)
 350—Dickinson, George, aged 17, City of London College, Assistant to a Chemist—French (2nd)
 907—Dickson, James, aged 23, Glasgow M.I., Clerk—Principles of Mechanics (2nd)
 360—Dix, George, aged 28, City of London College, Clerk—Book-keeping (2nd); German (3rd)
 743—Dixon, Alexander Campbell, aged 16, Thirsk M.I., Pupil Teacher—Arithmetic (2nd); English History (3rd); Geography (2nd)
 979—Dodworth, George Thompson, aged 19, People's College, Sheffield, Table-blade Forger—Arithmetic (3rd)
 564—Donaldson, John, aged 20, Newcastle-on-Tyne M.I., Engineer—Arithmetic (3rd); Practical Mechanics (1st) with 3rd Prize.
 32—Donnelly, Thomas, aged 21, Banbury M.I., Builder's Clerk—Arithmetic (2nd); Book-keeping (1st)
 44—Dorrington, Joseph, aged 22, Birmingham and Midland Inst., Electric Telegraph Clerk—Arithmetic (1st); Algebra (2nd)
 523—Dougall, John, aged 21, Manchester M.I., Mechanic—Book-keeping (2nd)
 404—Douglas, John Christie, aged 18, London M.I., Certificated Science Teacher—Arithmetic (3rd)
 524—Douglas, Peter, aged 17, Manchester M.I., Clerk—Arithmetic (2nd); Book-keeping (2nd); Algebra (3rd)
 960—Drew, Samuel, aged 17, Walsall W.M.C., Butcher—Arithmetic (2nd)
 160—Drew, Theodore, aged 19, Derby Working Men's Institution, Attorney's Clerk—Music (2nd)
 351—Druller, Sidney, aged 20, City of London College, Clerk in Post-office—Book-keeping (2nd)
 658—Dufty, Joseph, aged 19, People's College, Sheffield, Confectioner—Arithmetic (3rd); French (2nd)
 739—Dugmore, William, aged 19, Messrs. Chances' Library, Smethwick, Assistant Teacher—Freehand Drawing (3rd)
 827—Dunmur, Mathew, aged 18, Wellingborough M.I., Grocer's Apprentice—Geography (3rd)
 877—Duncan, Alexander, aged 20, Aberdeen M.I., Clerk—Book-keeping (3rd)
 871—Duncan, James, aged 20, Aberdeen M.I., Druggist—Chemistry (3rd)
 633—Dyson, Walter, aged 21, Salford Working Men's College, Chemist and Druggist—Botany (3rd)
 159—Eason, Frank, aged 25, Derby M.I., Clerk in H. M. Court of Probate—Music (2nd)
 513—Edmonson, James, aged 20, Manchester M.I., Clerk—Chemistry (3rd)
 608—Edwards, David, aged 17, Pembroke Dock M.I., Pupil Teacher—Arithmetic (1st); Geography (1st)
 678—Edwards, John, aged 18, Wolverhampton W. M. Coll., Clerk—Book-keeping (2nd)
 182—Ellis, Charles Jones, aged 23, Devonport M.I., Shipwright—Arithmetic (1st); Algebra (1st); Mensuration (2nd)
 173—Ellis, Richard John, aged 17, Devonport M.I. Shipwright Apprentice—Arithmetic (1st); Algebra (1st)
 42—Embrey, George, aged 21, Birmingham and Midland Inst., Electro-plater—Chemistry (3rd)
 364—Eve, Ebenezer, aged 26, City of London Coll. Barrister's Clerk—Animal Physiology (3rd)
 514—Eyres, Robert, aged 22, Manchester M.I., Warehouseman—Book-keeping (2nd)
 431—Fancourt, George, aged 17, St. Stephen's (Westminster) Evening School, Barrister's Clerk—Arithmetic (3rd)
 509—Faraday, Frederick James, aged 16, Manchester M.I., Salesman in Warehouse—English History (3rd)
 847—Farncomb, Edward, aged 34, Greenwich M.I., Teacher (Private)—English History (2nd); Free-hand Drawing (3rd)
 616—Ferguson, William, aged 19, Richmond Young Men's Society, Gardener—Botany (1st) with 1st Prize
 205—Findlay, Alexander Buchanan, aged 18, Glasgow Athenæum, Clerk—Book-keeping (2nd)
 605—Findlay, James Anderson, aged 16, Pembroke Dock M.I., Pupil Teacher—Arithmetic (2nd); Geography (1st)
 874—Finlayson, Alexander, aged 20, Aberdeen M.I., Writer—English History (2nd)
 73—Firth, Jonas, aged 22, Bradford M.I., Warehouseman—Book-keeping (2nd)
 367—Fisher, Benjamin, aged 19, City of London College, Clerk—Music (2nd)
 175—Fitz, Wm. James, aged 17, Devonport M.I., Shipwright Apprentice—Book-keeping (1st); Trigonometry (3rd)
 908—Fergie, Thomas, aged 21, Glasgow M.I., Jeweller—French (3rd)
 207—Forsyth, John, aged 22, Glasgow Athenæum, Grocer—English Literature (2nd); Latin and Roman History (2nd)
 333—Foster, John Spence, aged 35, City of London College, Clerk—Book-keeping (1st)
 136—Fox, William James, aged 19, Burnley M.I., Colourist—Chemistry (2nd)
 319—Foxcroft, George Henry, aged 18, Leeds Young Men's Christian Association, Cloth-dresser—Geography (2nd)
 206—Frame, Alexander, aged 23, Glasgow Athenæum, Mercantile Clerk—French (1st)
 791—Fraser, Elizabeth, aged 16, Glasgow Inst.—Domestic Economy (2nd)
 208—Frew, John, aged 22, Glasgow Athenæum, Clerk—French (2nd)

- 34—Fulford, Elizabeth, aged 18, Birmingham and Midland Inst.—English Literature (1st) with 1st Prize; English History (1st)
- 318—Furbank, Robert Archer, aged 17, Leeds Young Men's Christian Assoc., Clerk (Savings Bank)—Algebra (2nd)
- 311—Galloway, Samuel, aged 21, Leeds Young Men's Christian Association, Mechanic Fitter—Arithmetic (3rd)
- 617—Gammie, James A, aged 22, Richmond Parochial Library, Gardener—Botany (2nd)
- 619—Gardner, Richard, aged 19, Richmond Young Men's Society, Teacher—Arithmetic (1st); English History (1st); Algebra (3rd); Geography (1st)
- 373—Garside, Henry James, aged 18, City of London College, Clerk—Arithmetic (2nd); French (2nd)
- 546—Gelstharpe, Charles, aged 17, Middlesborough M.I., Worker in Laboratory—Chemistry (3rd)
- 738—Genner, Job, aged 22, Messrs. Chances' Library, Smethwick, Clerk—Arithmetic (1st) with 2nd Prize.
- 910—Gibb, Thomas, aged 22, Glasgow M.I., Surveyor—Geometrical Drawing (2nd)
- 955—Gibbs, John, aged 39, Chelmsford L. and M.I., Woolsorter, Geography (2nd)
- 911—Gibson, John, aged 23, Glasgow M.I., Commercial Clerk—French (3rd)
- 581—Gihon, John, aged 22, Oldham Lyceum, Civil Service—Navigation and Nautical Astronomy (2nd); Algebra (2nd)
- 458—Gilbert, Charles, aged 17, Leeds School of Art, Art Student—Freehand Drawing (2nd)
- 733—Gill, Joseph, aged 22, Messrs. Chances' Library, Smethwick, Clerk and Organist—Logic and Mental Science (3rd)
- 450—Gill, Thomas, aged 17, St. Thomas, Charter-house Evening Classes, Stamper—Arithmetic (3rd)
- 190—Glennie, Catherine Sophia, aged 22, Devonport M.I.—Freehand Drawing (2nd)
- 437—Göhns, Charles Diedrich Clemens, aged 21, St. Stephen's (Westminster) Evening School, Teller—Arithmetic (3rd)
- 610—Goodacre, Robert, aged 17, Peterborough M.I., Pupil Teacher—Arithmetic (3rd); English History (1st); Geography (2nd)
- 434—Goode, Frederick James, aged 18, St. Stephen's (Westminster) Evening School, Pupil Teacher—English History (2nd); Algebra (3rd); Geography (1st)
- 490—Gordon, Robert, aged 21, Liverpool Institute, Engineer—Geometrical Drawing (3rd); Algebra (2nd); Principles of Mechanics (2nd)
- 166—Gowings, William, aged 18, Devonport M.I., Shipwright Apprentice—Arithmetic (1st); Algebra (1st) Mensuration (2nd)
- 327—Goynes, John, aged 27, Leeds Young Men's Christian Association, Teacher—Arithmetic (2nd); Geography (1st)
- 980—Grant, Apulina, aged 17, Ladies' Educational Institution, Leeds—English History (2nd)
- 282—Grant, James, aged 20, Popular Evening Classes, Andersonian University, Glasgow, Warehouseman—Algebra (3rd); Geometry (3rd)
- 483—Greatorex, Edwin Stretton, aged 18, Leicester Church of England Inst., Clerk—Algebra (3rd)
- 353—Green, Charles, aged 23, City of London College, Clerk—Book-keeping (2nd)
- 825—Green, George, aged 26, Wellingborough M.I., Draper's Assistant—Arithmetic (3rd)
- 158—Green, John, aged 23, Derby M.I., Factory Operative—Book-keeping (1st)
- 321—Green, John Alfred, aged 21, Leeds Young Men's Christian Association, Clerk—Arithmetic (3rd); Book-keeping (1st)
- 80—Greenhough, John Gershom, aged 19, Bradford M.I., Merchant's Clerk—Algebra (1st); Geometry (1st) with 1st Prize; Trigonometry (2nd) (*His Royal Highness the Prince Consort's Prize of 25 Guineas*)
- 301—Greenwood, Samuel, aged 22, Harrison-road Young Men's Society, Halifax, Card Writer—Book-keeping (1st)
- 505—Greenwood, William Henry, aged 16, Manchester M.I.—Arithmetic (2nd); Chemistry (2nd); Animal Physiology (2nd); Geometry (3rd)
- 155—Grieveson, John, aged 29, Darlington Church of England Inst., Railway Agent—Arithmetic (3rd)
- 107—Griffiths, Henry Garman, aged 17, Bristol Athenæum, Mining Engineer—Chemistry (1st); Mining and Metallurgy (3rd); Principles of Mechanics (3rd)
- 604—Griffiths, William, aged 17, Pembroke Dock M.I., Pupil Teacher—Arithmetic (3rd)
- 963—Griffiths, William, aged 22, Stourbridge M.I., Schoolmaster—Arithmetic (1st); Book-keeping (2nd); Algebra (3rd)
- 952—Grigsby, David Day, aged 17, Chelmsford L. and M.I., Solicitor's Clerk—Geography (2nd)
- 337—Ground, William David, aged 20, City of London College, Clerk in H.M. Customs—Arithmetic (1st); English History (2nd)
- 309—Haigh, James, aged 19, Holmfirth M.I., Boot and Shoe Maker—Arithmetic (1st)
- 108—Hale, Joseph, aged 25, Bristol Trade School, Mining Engineer—Mining and Metallurgy (2nd)
- 389—Hall, Edward, aged 19, City of London College, Clerk—Book-keeping (2nd)
- 268—Hall, John, aged 25, Popular Evening Classes, Andersonian University, Glasgow, Inland Revenue Officer—Chemistry (2nd)
- 587—Hall, John, aged 18, Henshaw-street Mutual Improvement Society, Oldham, Book-keeper—Arithmetic (3rd)
- 860—Halliday, John, aged 19, Halifax, W.M. Coll., Warehouseman—Arithmetic (2nd)
- 131—Halstead, James, aged 19, Burnley M.I., Power-loom Weaver—Arithmetic (3rd)
- 768—Halton, John, aged 17, Wigan M.I., Clerk—Book-keeping (1st)
- 212—Hamilton, John Andrew, aged 21, Glasgow Athenæum, Law Clerk—Latin and Roman History (3rd)
- 439—Hammond, John, aged 18, Glover—Arithmetic (3rd)
- 480—Hancock, John Henry, aged 21, Leicester Church of England Inst., Hosier—Arithmetic (2nd)
- 775—Hampcastle, John William, aged 17, York Inst., Clerk—Algebra (3rd)
- 348—Harding, James Staughton, aged 22, City of London College, Clerk—French (1st) with 1st Prize; German (3rd)
- 722—Hardy, William Henry, aged 22, Wednesbury M.I., Clerk—Arithmetic (2nd); Book-keeping (1st)
- 670—Harindale, Alfred G., aged 17, St. Mary's Association, Southampton, Pupil Teacher—English History (3rd); Geography (3rd)
- 601—Harris, John, aged 19, Pembroke Dock M.I., Shipwright's Apprentice—Algebra (3rd)
- 571—Harris, Joseph, aged 17, Nottingham M.I., Pupil Teacher—Free-hand Drawing (3rd)
- 686—Harris, Joseph, aged 19, Wolverhampton W. M. Coll., Sawyer—Arithmetic (2nd); Book-keeping (2nd)
- 525—Harrison, John B., aged 29, Manchester M.I., Railway Clerk—Book-keeping (1st)
- 502—Harrison, John Pownall, aged 16, Manchester M.I., Warehouseman—Arithmetic (2nd); Book-keeping (2nd)
- 166—Hart, William, aged 28, Bristol Trade School, Storekeeper's Assistant—Geometrical Drawing (3rd)
- 213—Harvey, James, aged 21, Glasgow Athenæum, Warehouseman—French (2nd)

- 570—Harvey, Thomas Prickard, aged 17, Nottingham M.I., Clerk—Geography (3rd)
 459—Hassé, Alexander, aged 16, Leeds School of Art, Printseller—Free-hand Drawing (2nd)
 807—Hay, John, aged 20, Glasgow Inst., Assistant Teacher—Book-keeping (2nd)
 320—Hayward, Charles William, aged 17, Leeds Young Men's Christian Assoc., Cloth-dresser—Arithmetic (2nd)
 132—Healey, Thomas, aged 22, Burnley M.I., Book-keeper—Arithmetic (1st); English History (1st) with 2nd Prize; Mensuration (3rd)
 362—Hempleman, Herman, aged 25, City of London Coll., Clerk—Book-keeping (1st); German (3rd)
 538—Hewitt, Joseph, aged 18, Manchester M.I., Warehouseman—Arithmetic (3rd); Book-keeping (2nd)
 102—Higgins, Clement, aged 18, Bristol Trade School, Practical Chemist—Chemistry (2nd)
 957—Hill, James Samuel, aged 17, Walsall W. M. Coll., Pupil Teacher—Geometry (3rd)
 304—Hills, Henry George, aged 19, Hertford L. and S.I., Printer—English History (1st); Geometry (1st) with 2nd Prize
 948—Hirst, John, aged 23, Chelmsford L. and M.I., Schoolmaster—Arithmetic (3rd)
 448—Hobbs, Robert, aged 17, St. Thomas Charter-house Evening Classes, Pupil Teacher—Latin and Roman History (2nd)
 130—Holgate, James, aged 17, Burnley M.I., Clerk—Arithmetic (2nd)
 152—Holliday, Thomas, aged 23, Carlisle M.I., Shopman—Arithmetic (1st); Book-keeping (1st)
 729—Holloway, Isaac, aged 22, Messrs. Chance's Library, Smethwick, Glass Painter—Freehand Drawing (1st) with 1st Prize
 210—Holmes, Robert Anderson, aged 19, Glasgow Athenæum, Clerk—English Literature (2nd)
 632—Holt, Andrew, aged 23, Salford Working Men's College, Engraver to Calico Printers—Arithmetic (3rd)
 469—Hopkinson, John, aged 17, Leeds West-end People's Inst., Clerk—Arithmetic (3rd); Book-keeping (2nd)
 495—Horn, Thomas, aged 24, Liverpool Institute, Letter Carrier—Arithmetic (2nd)
 487—Horne, Thomas, aged 17, Liverpool Institute, Clerk—Arithmetic (2nd); English History (3rd)
 349—Hort, John, aged 23, City of London College, Clerk—Book-keeping (1st); English Literature (2nd)
 37—Hotchkiss, Edmond, aged 23, Birmingham and Midland Inst., Clerk—French (3rd)
 421—Howard, George, aged 22, Polytechnic Institution, Clerk—Algebra (2nd)
 400—Howard, James Harris, aged 18, London M.I., Clerk—French (3rd)
 387—Howard, Thomas Ross, aged 26, City of London College, Clerk (Customs)—English Literature (2nd)
 973—Howard, William, aged 29, St. Stephen's (Westminster) Evening School, Joiner—Free-hand Drawing (3rd)
 214—Howie, Richard, aged 20, Glasgow Athenæum, Student—Logic and Mental Science (3rd)
 516—Hoyle, William, aged 27, Manchester M.I., Operative Tobacconist—Book-keeping (2nd)
 970—Hughes, Hugh Lloyd, aged 20, City of London College, Clerk—German (3rd)
 855—Hughes, Robert Thorpe, aged 22, Halifax W.M. Coll., Warehouseman—Book-keeping (3rd)
 685—Humphreys, William, aged 21, Wolverhampton W. M. College, Tin-plate Worker—French (3rd)
 209—Hutcheson, David, aged 19, Glasgow Athenæum, Clerk—Book-keeping (1st)
 211—Hutcheson, George, aged 17, Glasgow Athenæum, Clerk—Book-keeping (1st); French (1st)
 826—Hyde, Robert Mettam, aged 19, Glasgow Inst., P. O. Clerk—English History (3rd)
 305—Ilott, James, aged 16, Hertford L. and S.I., Railway Clerk—Arithmetic (3rd)
 215—Ireland, John, aged 24, Glasgow Athenæum, Bank Clerk—Book-keeping (1st)
 148—Irvine, Robert, aged 22, Carlisle Church of England L.I., Teacher—Animal Physiology (2nd)
 845—Irvine, James, aged 29, Deptford, Sergeant in Metropolitan Police—Arithmetic (3rd)
 33—Jack, Allan Fulton, aged 20, Birmingham and Midland Inst., Clerk—French (2nd)
 371—Jackman, James, aged 26, City of London College, Clerk—Book-keeping (1st)
 157—Jackson, Henry, aged 28, Darlington Church of England Inst., Railway Clerk—Algebra (3rd)
 216—Jackson, John, aged 21, Glasgow Athenæum, Tobacconist's Assistant—German (3rd); English Literature (1st) with Prize of Books to the value of £1; Logic (1st) with 2nd Prize
 651—Jackson, Reuben, aged 23, People's College, Sheffield, Glass Cutter—French (3rd)
 833—Jacobs, Frederick Jones, aged 22, Hitchin M.I., Grocer's Assistant—Book-keeping (2nd)
 271—Jamieson, William Stevens, aged 16, Popular Evening Classes, Andersonian Univ., Glasgow, Pupil Teacher—Arithmetic (3rd); Astronomy (3rd); Geography (2nd)
 143—Jarman, Isaac James, aged 16, Bury St. Edmond's Athenæum, Pupil Teacher—Arithmetic (3rd)
 330—Jeeves, Charles Bass, aged 20, Greenwich Society for Diffusion of Useful Knowledge, Merchant's Clerk—Arithmetic (3rd)
 703—Jenks, Joseph, aged 16, Wolverhampton Young Men's Christian Inst., Clerk—Arithmetic (3rd)
 602—Johns, William, aged 17, Pembroke Dock M.I., Shipwright Apprentice—Mensuration (2nd)
 36—Johnson, Charles, aged 24, Birmingham and Midland Inst., Clerk—Arithmetic (1st)
 69—Johnson, Thomas, aged 24, Bradford M.I., Grocer's Assistant—Book-keeping (2nd); English Literature (3rd)
 716—Jones, Joseph, aged 18, West Bromwich Young Men's Christian Inst., Pupil Teacher—English History (3rd)
 493—Jones, William, aged 20, Liverpool M.I., Clerk (Junior)—Arithmetic (3rd); Book-keeping (2nd)
 401—Joseph, Isaac, aged 21, London M.I., Clerk—Algebra (2nd)
 492—Judge, Matthew Ebenezer, aged 16, Liverpool Institute, Clerk—Geography (2nd)
 520—Johnston, George, aged 21, Manchester M.I., Clerk—Book-keeping (1st)
 407—Kennedy, James, aged 18, London M.I., Clerk—Practical Mechanics (2nd)
 870—Kilgour, George, aged 17, Aberdeen M.I., Draper—Arithmetic (2nd); Book-keeping (1st)
 114—King, George Henry, aged 17, Brompton Church of Eng. Young Men's Inst., Pupil Teacher—Arithmetic (2nd)
 113—King, John Harris, aged 17, Brompton Church of England Young Men's Inst., Shipwright's Apprentice—Arithmetic (2nd)
 445—Kingdom, Oliver, aged 30, St. Thomas Charterhouse Evening Classes, Harness Maker—Arithmetic (3rd)
 302—Kingston, John Samuel, aged 16, Hertford Literary and Scientific Inst., Grocer's Assistant—Arithmetic (2nd); Geography (2nd)
 408—Kirk, Richard Edward Gent, aged 18, London M.I., Clerk in H.M. Record-office—English History (2nd)
 801—Kirk, Robert Simpson, aged 21, Glasgow Inst., Clerk (in Publishing Office)—Latin and Roman History (2nd)
 71—Knight, Joseph, aged 20, Bradford M.I., Clerk—Arithmetic (3rd); Book-keeping (1st); Geography (2nd)
 306—Knight, Robert John, aged 17, Hertford L. and S.I., Railway Clerk—Arithmetic (3rd)
 647—Lacon, Joseph, aged 19, People's College, Sheffield, Merchant's Clerk—Arithmetic (2nd)

- 832—Latchmore, George, aged 24, Hitchin M.I., Banker's Clerk—Geography (2nd)
 661—Laughton, Richard Hind, aged 19, People's Coll., Sheffield, Clerk in Merchant's Warehouse—Book-keeping (1st)
 344—Law, Calvert, aged 21, City of London College, Clerk—Arithmetic (2nd)
 829—Lawman, William, aged 17, Wellingborough M.I., Draper's Apprentice—Arithmetic (2nd)
 504—Lee, Ambrose, aged 16, Manchester M.I.—Animal Physiology (3rd)
 950—Le Fevre, John, aged 20, Chelmsford L. and M.I., Harness Maker—Geography (3rd)
 669—Leggoss, Frederic Edwin, aged 20, People's College, Sheffield, Merchant's Clerk—Book-keeping (2nd); Algebra (3rd); Latin and Roman History (3rd)
 284—Letters, Geo. Gilfillan, aged 22, Popular Evening Classes, Andersonian Univ., Glasgow, Clerk—Arithmetic (3rd)
 340—Levy, Joseph Hiam, aged 23, City of London College—Algebra (2nd); Geometry (1st)
 573—Lewis, Owen, aged 30, Nottingham M.I., Scripture Reader—Arithmetic (3rd); Botany (3rd)
 551—Lightfoot, Thomas, aged 17, Middlesborough M.I., Engine Fitter—Arithmetic (2nd)
 119—Lines, Richard, aged 17, Brompton Church of England Institution, Pupil Teacher—Arithmetic (1st); English History (2nd); Algebra (3rd)
 465—Lister, Robert, aged 19, Leeds Church Institute, Teacher in Private School—Arithmetic (1st); Geography (1st)
 63—Liversedge, Alfred, aged 21, Bradford M.I., Warehouseman—Arithmetic (3rd)
 342—Lloyd, Thomas John, aged 20, City of London College, Clerk—Arithmetic (1st)
 424—Logan, Colin, aged 29, Polytechnic Institution, Clerk—Book-keeping (1st); French (3rd)
 756—Logan, Henry, aged 21, Wakefield M.I., Iron Moulder—Mensuration (2nd)
 18—Lord, William, aged 16, Bæup M.I., Arithmetic (3rd), Book-keeping (2nd)
 914—London, James, aged 33, Glasgow M.I., Tailor—Magnetism, Electricity, and Heat (1st) with 1st Prize.
 323—Lowden, Charles, aged 17, Leeds Young Men's Christian Association, Apprentice to Woollen Merchant—Book-keeping (2nd)
 217—Lowe, David, aged 22, Glasgow Athenæum, Mercantile Clerk—Book-keeping (1st)
 410—Macdonald, Archibald Simon Lang, aged 22, London M.I., Clerk—Book-keeping (1st) with 1st Prize; Practical Mechanics (1st) with 2nd Prize; Principles of Mechanics (2nd)
 242—Macdonald, Donald Cuthbertson, aged 16, Glasgow Athenæum, Accountant's Clerk—Book-keeping (2nd)
 222—Macdonald, Roderick, aged 21, Glasgow Athenæum, Student (Queen's Scholar)—Logic and Mental Science (2nd)
 262—Macfadyen, Wm. Ritchie, aged 17, Popular Even. Classes, Andersonian University, Glasgow, Clerk—Chemistry (2nd)
 219—Macfarlane, Walter, aged 21, Glasgow Athenæum, Warehouseman—Logic and Mental Science (2nd)
 220—Macgill, William, aged 19, Glasgow Athenæum, Teacher—French (1st)
 918—Mackenzie, Charles, aged 23, Glasgow M.I., Measurer—Arithmetic (2nd); Mensuration (3rd)
 866—MacKillean, John, aged 29, Aberdeen M.I., Watchmaker—Principles of Mechanics (3rd)
 792—Mackintosh, Margaret, aged 18, Glasgow Inst., Sempstress—Domestic Economy (3rd)
 491—MacKnight, Edward, aged 23, Liverpool Inst., Foreign Correspondent—German (3rd)
 275—Macnair, Robert, aged 18, Popular Evening Classes, Andersonian University, Glasgow, Clerk—Astronomy (2nd)
 223—Macnaught, James Robert, aged 18, Glasgow Athenæum, Clerk—French (2nd)
 254—Mahony, James Alexander, aged 20, Popular Evening Classes, Andersonian University, Glasgow, Clerk—Animal Physiology (2nd)
 291—Mallinson, Jos., aged 19, Harrison-road Young Men's Society, Halifax, Clerk—Arithmetic (3rd); Book-keeping (1st)
 915—Mann, James, aged 20, Glasgow M.I., Clerk—Book-keeping (1st); German (3rd)
 391—Marriott, Joseph, aged 29, City of London College, Clerk—Arithmetic (2nd); Music (3rd)
 532—Marsh, Clement, aged 22, Manchester M.I., Clerk—Book-keeping (1st); French (1st)
 606—Marsh, William James, aged 18, Pembroke Dock M.I., Shipwright Apprentice—Arithmetic (2nd)
 366—Marshall, Henry, aged 18, City of London College, Mercantile Clerk—German (2nd)
 164—Marshall, John, aged 17, Devonport M.I., Ironmonger—Arithmetic (3rd); English History (3rd); French (3rd)
 381—Masham, William George, aged 21, City of London College, Commercial Clerk—Arithmetic (1st); Book-keeping (1st)
 591—Mathieson, John, aged 23, Paisley Artisan's I., Tailor—Music (2nd)
 474—May, Thomas, aged 33, Leeds M.I., Mechanic—Algebra (3rd); Mensuration (3rd)
 255—McCartney, William Newton, aged 22, Popular Evening Classes, Andersonian University, Glasgow, Salesman—Animal Physiology (3rd)
 964—McCully, Richard, aged 31, Stourbridge M.I., Clerk—English Literature (1st), with Prize of Books to the value of £1;—Book-keeping (2nd); German (3rd)
 817—McIntosh, William, aged 23, Glasgow Inst., Clerk—Book-keeping (1st)
 221—McKay, John, aged 21, Glasgow Athenæum, Student (Queen's Scholar)—Logic and Mental Science (2nd)
 281—McKenzie, James, aged 16, Popular Evening Classes, Andersonian University, Glasgow, Accountant's Clerk—Arithmetic (2nd); Algebra (3rd); Latin and Roman History (2nd)
 244—McKillop, James, aged 17, Popular Evening Classes, Andersonian University, Glasgow, Coal Miner—Mining and Metallurgy (2nd)
 850—McGough, John, aged 19, St. Peter's Night School, Derby, Coach Maker's Apprentice—Arithmetic (3rd); Book-keeping (2nd)
 919—McLachlan, William, aged 19, Glasgow M.I., Clerk—Arithmetic (3rd)
 630—McLaughlin, James, aged 25, Salford Working Men's College, Clerk—Arithmetic (3rd); Book-keeping (1st)
 276—McLaurin, William, aged 16, Popular Evening Classes, Andersonian University, Glasgow, Chemist—Arithmetic (2nd)
 808—McLean, Peter, aged 21, Glasgow Inst., Clerk—Book-keeping (1st)
 596—McLennan, Thomas B., aged 22, Paisley Artisans' Institution, Pattern Designer—Music (2nd)
 428—McLeod, Daniel Henry, aged 18, St. Stephens (Westminster) Evening School, Pupil Teacher—Arithmetic (3rd)
 795—McMillan, Andrew, aged 19, Glasgow Inst., Ironmonger's Assistant—Logic and Mental Science (3rd)
 375—Mears, Henry, aged 26, City of London College, Warehouseman—French (3rd)
 742—Metcalfe, Joseph, aged 17, Thirsk M.I., Pupil Teacher—English History (3rd); Geography (2nd)
 977—Middleton, William, aged 29, Aberdeen M.I., Law Clerk—Arithmetic (3rd); Book-keeping (2nd)
 653—Midgeley, Joseph, aged 25, People's College, Sheffield, Railway Clerk—Book-keeping (2nd)

- 916—Millar, William James, aged 23, Glasgow M.I., Collector—Geography (2nd); Magnetism, Electricity, and Heat (2nd); French (3rd)
- 224—Millen, Thomas Wilson, aged 23, Glasgow Athenæum, Book-keeper—French (1st)
- 250—Miller, James, aged 25, Popular Evening Classes, Andersonian University, Glasgow, Colliery Clerk—Mining and Metallurgy (3rd)
- 803—Miller, William Robertson, aged 19, Glasgow Inst., Engineer's Apprentice—Geometry (3rd)
- 87—Mills Joseph William, aged 19, Portsea Watt Inst., Clerk or Teacher (proposed)—Book-keeping (2nd); French (3rd); Trigonometry (3rd)
- 890—Mitchell, John, aged 24, Aberdeen M.I., Art Pupil Teacher—Music (2nd); Free-hand Drawing (3rd)
- 481—Mitchell, Joseph, aged 17, Leicester Church of England Inst., Chemist—English History (2nd); Latin and Roman History (1st)
- 256—Moir, James, aged 20, Popular Evening Classes, Andersonian Univ., Glasgow, Clerk—Animal Physiology (3rd)
- 161—Monk, Richard Rugg, aged 16, Devonport M.I., Pawnbroker's Assistant—Arithmetic (3rd); English History (1st)
- 184—Moorshead, Henry, aged 17, Devonport M.I., Architect's Pupil—Arithmetic (2nd)
- 2—Moorton, Henry, aged 24, Farnham Young Men's Association, Teacher—Arithmetic (3rd); Book-keeping (2nd)
- 810—Morison, Donald, aged 26, Glasgow Inst., Clerk (Inland Revenue)—Book-keeping (1st)
- 612—Morris, William Meering, aged 23, Poole M.I., Carpenter and Joiner—English History (2nd)
- 797—Morrison, James, aged 19, Glasgow Inst., Accountant's Clerk—Latin and Roman History (2nd)
- 777—Morritt, William, aged 26, York Inst., Tailor—Book-keeping (3rd)
- 858—Muir, Joseph, aged 25, Halifax W. M. Coll., Woolstapler—Book-keeping (1st)
- 286—Muir, Thomas, aged 18, Popular Evening Classes, Andersonian University, Glasgow, studying Colliery Management—Mining and Metallurgy (1st) with 2nd Prize
- 728—Mulcaster, George, aged 21, Messrs. Chances' Library, Smethwick, Glass Packer—Book-keeping (1st)
- 447—Murray, Charles William, aged 18, St. Thomas Charterhouse Evening Classes, Pupil Teacher—Latin and Roman History (2nd)
- 859—Mycock, Edward John, aged 19, Halifax W. M. Coll., Druggist's Apprentice—Chemistry (3rd)
- 453—Myers, Thomas, aged 23, Leeds Young Men's Christian Association, Clerk—Trigonometry (3rd); English History (2nd); Geography (1st) with 2nd Prize
- 856—Naylor, John, aged 21, Halifax W. M. Coll., Rug Finisher—Music (2nd)
- 796—Neil, James, aged 16, Glasgow Institution, Messenger—Freehand Drawing (2nd)
- 496—Neilson, George Hume, aged 28, Liverpool Institute, Letter Carrier—Algebra (2nd)
- 13—Nesbit, Thomas, aged 27, Ashford S. E. Railway M.I., Railway Clerk—English History (1st)
- 719—Nevey, Charles Burns, aged 22, West Bromwich Young Men's Christian Institution, Accountant's Clerk—Algebra (2nd); Mensuration (3rd)
- 715—Newman, Henry, aged 31, Wordsley Mutual Improvement Society, School Teacher—Arithmetic (3rd)
- 146—Noble, John, aged 21, Carlisle Church of England, Lit. and Sci. Inst., Chemist and Druggist—Chemistry (2nd)
- 293—Noble, Joseph, aged 17, Black Dyke Mills M.I., Halifax, Packer—Arithmetic (3rd); Algebra (3rd); Mensuration (3rd)
- 402—Norris, George M., aged 20, London M.I., Clerk—Geography (1st)
- 947—Northam, John, aged 31, Chelmsford L. and M.I., Clerk—Book-keeping (1st)
- 395—Nott, Samuel Freeman, aged 18, City of London College, Clerk—Arithmetic (3rd)
- 94—Nunn, Edward Smith, aged 23, Bristol Young Men's Christian Association, Engine Fitter—Book-keeping (2nd) Arithmetic (3rd)
- 142—Nuttall, John Henry, aged 17, Bury Athenæum—French (3rd)
- 264—Ogilvy, David John, aged 16, Popular Evening Classes, Andersonian University, Glasgow, Student of Chemistry—Chemistry (1st)
- 177—Oleson, John Rowley, aged 20, Devonport M.I., Shipwright Apprentice—Arithmetic (2nd); Algebra (2nd); Mensuration (3rd)
- 420—Overhead, William, aged 28, Polytechnic Institution, Bookseller—Book-keeping (3rd)
- 727—Overton, Frederick Job, aged 19, Walsall W. M. Coll., Saddlers' Ironmonger—French (2nd)
- 314—Oxley, William, aged 19, Leeds Young Men's Christian Institution, Pupil Teacher—English History (3rd); Geography (2nd)
- 369—Packenham, Jesse John, aged 29, City of London College, Viewer, (Iron Inspection Department, Tower of London)—English Literature (2nd)
- 967—Palfrey, Mark, aged 21, Stourbridge M.I., Spade Maker—Book-keeping (3rd)
- 436—Palmer, William Henry, aged 18, St. Stephen's (Westminster) Evening School, Pupil Teacher—Arithmetic (3rd)
- 243—Park, John, aged 20, Popular Evening Classes, Andersonian University, Glasgow, Engine Keeper—Mining and Metallurgy (2nd)
- 920—Parker, John Dunlop, aged 18, Glasgow M.I., Civil Engineer—Geometry (3rd)
- 104—Parker, Samuel Isaac, aged 16, Bristol Trade School, Engineer—Geometrical Drawing (3rd)
- 96—Partridge, George, aged 21, Bristol Young Men's Christian Assoc., Clerk—Arithmetic (3rd); Book-keeping (1st)
- 784—Paterson, Arthur William, aged 18, Barnet Inst., Builder—Arithmetic (3rd); Book-keeping (3rd)
- 783—Paterson, Frederick, aged 16, Barnet Institute—Music (2nd)
- 881—Paterson, John, aged 20, Aberdeen M.I., Joiner—French (1st)
- 971—Payne, James, jun., aged 24, Blandford L.L., Attorney's Clerk—Algebra (2nd); English History (2nd); Geometrical Drawing (3rd); Logic and Mental Science (3rd)
- 882—Peterkin, Henry, aged 17, Aberdeen M.I.—Free hand Drawing (3rd)
- 93—Phillips, William Henry, aged 23, Bristol Young Men's Christian Assoc., Compositor—Book-keeping (2nd)
- 20—Pilling, James, aged 24, Bacup M.I., Weaver—English History (3rd)
- 597—Pollock, David C. aged 21, Paisley Artisans' Institution, Pattern Designer—Music (2nd)
- 117—Potter, Frederic Charles, aged 16, Brompton Church of England Young Men's Institute, Pupil Teacher—Arithmetic (1st)
- 357—Potter, Frederick William, aged 22, City of London College, Clerk—Chemistry (1st)
- 488—Powell, Edward, aged 21, Liverpool Institute, Watch Finisher—Political and Social Economy (2nd)
- 702—Pratt, Alfred Camden, aged 37, Wolverhampton Young Men's Christian I., Reporter—Animal Physiology (3rd)

- 70—Prince, Charlesworth, aged 21, Bradford M.I., Woolsorter—Book-keeping (2nd)
 769—Procter, Ralph Whitaker, aged 18, Wigan M.I.—Latin and Roman History (2nd)
 43—Prosser, William Henry, aged 18, Birmingham and Midland I., Engineer's Apprentice—Practical Mechanics (2nd)
 123—Pullin, Joseph Shirley, aged 17, Windsor and Eton L. and S.I., Civil Service—Arithmetic (1st); English History (3rd); Geography (1st)
 633—Pyatt, William, aged 17, Wolverhampton Working Men's College, Joiner—Arithmetic (3rd)
 246—Racliffe, James, aged 22, Popular Evening Classes, Andersonian University, Glasgow, Coal Miner—Mining and Metallurgy (2nd)
 227—Rae, Gavin, aged 25, Glasgow Athenæum, Currier—English Literature (3rd)
 837—Raisin, William Lawrence, aged 19, London M.I., Ornamental Engraver—German (3rd)
 145—Reach, John, aged 18, Bury St. Edmond's Athenæum, Pupil Teacher—English History (3rd)
 338—Rees, Alfred Thomas, aged 20, London M.I., Stationer—Botany (3rd)
 734—Reeves, Frederick, aged 21, Messrs. Chance's Library, Smethwick, Glass Cutter—French (2nd)
 789—Reid, William, aged 19, Glasgow Inst., Assistant Teacher—Arithmetic (2nd); Book-keeping (2nd)
 623—Rhodes, Francis, aged 19, Salford Working Men's College, Druggist—Chemistry (2nd)
 746—Richards, Thomas, aged 23, Wakefield M.I., Carpet Weaver—Algebra (2nd)
 561—Richardson, Elizabeth, aged 23, Newcastle-on-Tyne—Animal Physiology (3rd); Freehand Drawing (2nd)
 558—Richardson, Jane, aged 24, Newcastle-on-Tyne—English History (3rd)
 557—Richardson, Sarah Ann, aged 25, Newcastle-on-Tyne—Geography (2nd)
 176—Rickard, George James, aged 18, Devonport M.I., Shipwright—Algebra (2nd); Geometrical Drawing (3rd); English History (3rd)
 180—Rickard, George Pearne, aged 19, Devonport M.I.—Arithmetic (3rd); Book-keeping (1st); English Literature (2nd); Geography (2nd)
 137—Riding, William, aged 16, Burnley M.I., Engineer's Apprentice—Arithmetic (2nd)
 575—Rigg, William, aged 22, Nottingham M.I., Teacher—Arithmetic (3rd); French (3rd)
 297—Riley, James, aged 22, Harrison-road Young Men's Society, Halifax, Carrier's Agent—Book-keeping (1st)
 228—Rintoul, Robert, aged 23, Glasgow Athenæum, Clerk—Arithmetic (2nd); English History (1st) with Prize of Books to the value of £1.
 72—Roberts, Joseph Seed, aged 21, Bradford M.I., Cabinet Maker—Book-keeping (1st); Magnetism, Electricity and Heat (2nd); Animal Physiology (3rd)
 289—Robertshaw, Alfred, aged 20, Halifax M.I., Warehouseman—French (1st)
 231—Robertson, Helen, aged 21, Glasgow Athenæum—French (1st)
 736—Robinson, James, aged 18, Messrs. Chances' Library, Smethwick, Clerk—Book-keeping (1st)
 563—Robinson, John Mallam, aged 30, Newcastle-on-Tyne M.I., Clerk—Arithmetic (1st); Algebra (3rd); Mensuration (2nd)
 229—Rodman, Robert, aged 17, Glasgow Athenæum, Clerk—Logic and Mental Science (1st) with 1st Prize
 611—Rogers, Benjamin Robert, aged 17, Peterborough M.I., Pupil Teacher—Arithmetic (3rd); English History (2nd); Geography (1st)
 812—Ross, David, aged 19, Glasgow Inst., Pupil Teacher—Arithmetic (2nd); English History (1st); Algebra (2nd); Geography (1st)
 472—Ruddock, William, aged 16, Leeds M.I., Clerk—French (3rd)
 464—Rushworth, Joseph, aged 16, Leeds Church Institute, Pupil Teacher—Arithmetic (2nd)
 924—Russell, George, aged 22, Glasgow M.I., Mechanical Engineer—Practical Mechanics (1st), with 1st Prize
 149—Rutherford, David, aged 18, Carlisle Church of England L.I., Assistant Teacher—Latin and Roman History (3rd)
 79—Ryeroff, John Denison, aged 17, Bradford M.I., Book-keeper's Assistant—Book-keeping (2nd)
 712—Ryder, Richard, aged 18, Wordsley Mutual Improvement Society, Pupil Teacher—English History (3rd); Geography (3rd)
 154—Sandford, William, aged 21, Carlisle M.I., Solicitor's Clerk—Arithmetic (2nd)
 533—Saunders, George Henry, aged 26, Manchester M.I., Warehouseman—French (3rd)
 328—Saville, James Walker, aged 20, Leeds Young Men's Christian Association, Clerk—Music (2nd)
 98—Sawtell, Samuel A., aged 21, Bristol Young Men's Christian Association, Jeweller—Book-keeping (2nd)
 543—Scaife, Robert, aged 23, Middlesborough M.I., Solicitor's Clerk—Arithmetic (3rd)
 144—Scamp, Thomas, aged 22, Bury St. Edmond's Athenæum, Teacher—Arithmetic (1st); Geography (1st)
 8—Scargill, Horace, aged 18, Farnham Young Men's Association, Solicitor's Clerk—Book-keeping (2nd)
 627—Seddon, Robert, aged 25, Salford Working Men's College, Clerk—Arithmetic (3rd)
 577—Senneck, Stephen, aged 16, Nottingham M.I., Civil Engineer—Arithmetic (3rd)
 760—Sexton, Thomas, aged 17, Waterford M.I.—Geography (3rd)
 258—Shedden, William, aged 23, Popular Evening Classes, Andersonian University, Glasgow, Assistant Teacher—Latin and Roman History (3rd)
 535—Sidebotham, Samuel, aged 22, Manchester M.I., Clerk—French (2nd)
 717—Silvester, William, aged 23, West Bromwich Young Men's Christian Inst., Clerk—Arithmetic (1st)
 232—Simpson, Alexander, aged 20, Glasgow Athenæum, Teacher—Logic and Mental Science (1st)
 233—Simpson, Samuel, aged 27, Glasgow Athenæum, Book-keeper—French (1st)
 927—Simpson, William, aged 18, Glasgow M.I., Clerk—Book-keeping (1st); Political and Social Economy (2nd)
 12—Skelton, John Henry, aged 18, Ashford S.E. Railway M.I., Railway Clerk—Mensuration (2nd)
 821—Sloan, Archibald, aged 21, Glasgow Inst., Teacher—Algebra (3rd)
 273—Sloan, John, aged 30, Popular Evening Classes, Andersonian University, Glasgow, Jacquard Power Loom Tenter—Magnetism, Electricity, and Heat (2nd)
 763—Smalley, James, aged 45, Wigan M.I., Tailor and Draper—Music (2nd)
 764—Smalley, William, aged 17, Wigan M.I., Tailor and Draper—Arithmetic (2nd); Geography (1st)
 270—Smart, Alexander W., aged 21, Popular Evening Classes, Andersonian University, Glasgow, Manufacturer—Astronomy (3rd)
 29—Smart, James, aged 16, Banbury M.I., Printer—Animal Physiology (2nd)
 253—Smart, James, aged 34, Popular Evening Classes, Andersonian University, Glasgow, Coal Salesman—(Mining and Metallurgy—(2nd)
 624—Smethurst, James, aged 26, Salford Working Men's College, Core Maker—Chemistry (2nd)

- 726—Smith, Benjamin, aged 21, Wednesbury M.I., Colliery Clerk—Arithmetic (1st); Book-keeping (1st); Mensuration (3rd)
- 550—Smith, David, aged 21, Middlesbro' M.I., H.M. Customs (Out Door Officer)—Arithmetic (1st)
- 122—Smith Edmund William, aged 37, Shaw Farm Institution, Attendant on Machinery—Arithmetic (3rd); English History (2nd); Geography (2nd)
- 8—Smith, George, aged 19, Asinford S.E. Railway M.I., Engine Fitter—Arithmetic (3rd)
- 456—Smith, James, aged 18, Leeds Church Institute, Pupil Teacher—Arithmetic (2nd)
- 374—Smith, James Rigby, aged 21, City of London College, Boot Maker—English Literature (1st) with 3rd Prize
- 562—Smith, John Embleton, aged 19, Newcastle-on-Tyne M.I., Clerk—Arithmetic (3rd); English Literature (3rd)
- 958—Smith, John Harcourt, aged 23, Walsall Working Men's College, Solicitor's Clerk—Geometry (3rd)
- 403—Smith, Martha, aged 17, London M.I.—Geography (3rd)
- 811—Smith, Robert, aged 18, Glasgow Inst., Upholsterer—Free hand Drawing (3rd)
- 867—Smith, William, aged 20, Aberdeen M.I., Iron Turner—English Literature (3rd)
- 954—Smith, William Edward, aged 18, Chelmsford L. & M.I., Solicitor's Clerk—Geography (3rd)
- 823—Smith, David, aged 21, Glasgow Institution, Saddler—Conic Sections (2nd); Logic and Mental Science (1st); also as No. 926, Glasgow Mechanics' Institute—Animal Physiology (3rd)
- 479—Sneath, George, aged 20, Leicester Church of England L., Accountant's Clerk—Arithmetic (1st); Algebra, (3rd);
- 569—Sowden, Thomas Henry, aged 21, Newcastle-on-Tyne M.I., Railway Clerk—English History (2nd)
- 701—Sowray, Charles William, aged 23, Wolverhampton Young Men's Christian Institution, Schoolmaster—Arithmetic (1st); Geography (1st)
- 852—Spencer, James, aged 28, Halifax W. M. Coll., Bookbinder—Book-keeping (1st)
- 171—Spiller, William, aged 18, Devonport M.I., Shipwright Apprentice—Arithmetic (2nd); Book-keeping (2nd) Algebra (3rd)
- 382—Standliff, George Joseph, aged 17, City of London College, Stationer's Clerk—Arithmetic (1st)
- 681—Stannah, Joseph, aged 25, Wolverhampton W. M. Coll., Engineer—Arithmetic (2nd); Algebra (3rd)
- 615—Stanton, George, aged 21, Richmond Young Men's Society, Gardener—Arithmetic (3rd); Botany (2nd)
- 711—Steele, Walter, aged 18, Wordsley Mutual Improvement Society, Pupil Teacher—Arithmetic (3rd)
- 230—Stenhouse, William McStravick, aged 20, Glasgow Athenæum, Commercial Clerk—Algebra (3rd)
- 352—Stevens, Henry Osborne, aged 26, City of London College, Clerk—Book-keeping (1st)
- 193—Stevenson, Andrew, aged 19, Glasgow Athenæum, Jeweller's Shopman—Arithmetic (3rd)
- 928—Stewart, Henry, aged 23, Glasgow M.I., Clerk—Book-keeping (1st)
- 25—Stewart, Robert, aged 16, Bacup M.I., Pupil Teacher—Arithmetic (3rd); Geography (3rd)
- 809—Stewart, Robert, aged 23, Glasgow Inst., Clerk (Inland Revenue)—Book-keeping (1st)
- 411—Stewart, William, aged 18, London M.I., Solicitor's Clerk—Arithmetic (2nd); Book-keeping (2nd)
- 590—Stopford, James, aged 31, Henshaw-street Mutual Improvement Society, Oldham, Self-Actor Minder—Arithmetic (3rd)
- 4—Stovold, John, aged 17, Farnham Young Men's Association, Grocer—Book-keeping (3rd)
- 862—Stradling, Thomas, aged 19, Halifax W. M. Coll., Carpet Weaver—English Literature (2nd)
- 802—Straine, George, aged 25, Glasgow Inst., Piano-forte Maker—Music (2nd)
- 554—Stratton, Robert, aged 24, Newcastle-on-Tyne Church Institute, Certificated Schoolmaster—English History (2nd); Astronomy (2nd); Logic and Mental Science (1st)
- 287—Sugden, Joseph, jun., aged 18, Harrison-road Young Men's Society, Halifax, Apprentice to Chemist and Drug gist—French (3rd)
- 975—Sutcliffe, Samuel, aged 18, Halifax W.M. Coll., Joiner—Book-keeping (3rd)
- 506—Sutcliffe, William, aged 16, Manchester M.I., Clerk—Animal Physiology (3rd)
- 463—Sutton, John, aged 17, Leeds Church Institute, Pupil Teacher—Arithmetic (2nd); English History (2nd) Mensuration (3rd)
- 263—Swan, Herbert Arthur, aged 19, Popular Evening Classes, Andersonian Univ., Glasgow, Clerk—Chemistry (3rd)
- 766—Swarbrick, Thomas, aged 20, Wigan M.I., Book-keeper—Arithmetic (1st); Book-keeping (1st); Mensuration (3rd)
- 399—Symon, James Sutherland, aged 26, London M.I., Clerk—Domestic Economy (1st), with 1st Prize; Logic and Mental Science (2nd)
- 485—Tapp, John George William, aged 17, St. Stephen's (Westminster) Evening School, Pupil Teacher—Arithmetic (1st); Book-keeping (3rd)
- 709—Tart, John Bailey, aged 23, Bilston Institution, Grocer's Assistant—Arithmetic (3rd)
- 451—Taylor, John, aged 21, Leeds Young Men's Christian Association, Attorney's Clerk—Book keeping (1st)
- 517—Taylor, John, aged 18, Manchester M.I., Clerk—Book-keeping (1st)
- 541—Taylor, Joseph, aged 19, Manchester M.I., Clerk—Arithmetic (3rd)
- 861—Taylor, Joseph, aged 18, Halifax W. M. Coll., Warehouseman—Arithmetic (2nd); Book-keeping (1st)
- 741—Taylor, Willmott, aged 19, Messrs. Chance's Library, Smethwick, Commercial Clerk—Book-keeping (1st)
- 473—Teale, Thomas, aged 17, Holbeck M.I., Mechanic—Arithmetic (2nd); Mensuration (3rd)
- 409—Telfer, Henry, aged 18, London M.I., Barrister's Clerk—English History (2nd)
- 178—Thearle, Samuel, aged 16, Devonport M.I., Shipwright Apprentice—Arithmetic (2nd); Algebra (2nd)
- 603—Thomas, Thomas Walters, aged 30, Pembroke Dock M.I., Marble Mason—Music (2nd)
- 652—Thompson, John, aged 25, People's College, Sheffield, File Manager—German (3rd)
- 594—Thomson, John Gordon, aged 17, Paisley Artisans' Institution, Clerk—Arithmetic (3rd); Book-keeping (1st); Geography (3rd)
- 599—Thomson, Malcolm, aged 23, Paisley Artisan's Institution, Clerk—Arithmetic (3rd)
- 317—Tiffany, John Barnes, aged 18, Leeds Young Men's Christian Association, Tobacco Manufacturer—Arithmetic (3rd); Algebra (3rd); Geometry (3rd)
- 631—Tinling, Thomas, aged 17, Salford W. M. Coll., Assistant in a Shoe Manufactory—Book-keeping (2nd)
- 315—Todd, William, aged 16, Leeds Young Men's Christian Association, Wool Sorter—Geography (2nd)
- 426—Todd, William, aged 29, Polytechnic Institution, Clerk—Book-keeping (2nd)
- 246—Tongue, Alfred Henry, aged 16, City of London College, Clerk—Geography (3rd)
- 441—Tope, Charles William, aged 19, St. Thomas Charterhouse Evening Classes, Assistant (Civil Service Commissioners)—Arithmetic (3rd); English History (3rd)

- 853—Toothill, Abel, aged 19, Halifax W. M. Coll., Clerk—Book-keeping (1st)
 332—Traupaud, Cyrus Plaistow, aged 19, Greenwich Useful Knowledge Society, Clerk—Arithmetic (3rd); Algebra (3rd); English History (3rd)
 169—Trayes, Francis Collins, aged 17, Devonport M.I., Pupil Teacher—Arithmetic (3rd); English History (2nd); Geography (2nd)
 170—Treleven, Joseph Thomas, aged 17, Devonport M.I., Shipwright Apprentice—Arithmetic (2nd); Algebra (3rd); Mensuration (3rd)
 929—Tulloch, George, Glasgow M.I., Civil Engineer—Arithmetic (2nd)
 844—Turner, James, aged 17, Deptford, Bookseller's Assistant—Arithmetic (3rd)
 720—Tyler, Samuel, aged 22, Wednesbury M.I., Draughtsman—Arithmetic (2nd); Mensuration (2nd)
 185—Ugnow, James Bath, aged 22, Devonport M.I., Shipwright—Arithmetic (2nd); English Literature (2nd)
 868—Valentine, John Sutherland, aged 19, Aberdeen M.I., Clerk—Arithmetic (2nd); Algebra (2nd); Principles of Mechanics (2nd)
 111—Vane, James, aged 20, Brompton Church of England Young Men's Inst., Assistant Master—Geography (3rd)
 384—Vaughan, William, aged 21, City of London College, Clerk—Book-keeping (1st); Mensuration (1st) with 2nd Prize; Algebra (2nd)
 511—Vosper, Thomas, aged 16, Manchester M.I., Pupil Assistant to a Chemist—Geometry (3rd)
 85—Waddington, Albert, aged 19, Bradford M.I., Solicitor's Clerk—Arithmetic (2nd); Book-keeping (1st)
 236—Wade, James, aged 25, Glasgow Athenæum, Cashier—French (2nd); Geometry (3rd)
 325—Wainwright, Henry, aged 18, Leeds Young Men's Christian Association, Clerk—Arithmetic (2nd); Book-keeping (1st)
 534—Walker, Edward, aged 18, Manchester M.I., Draughtsman—Algebra (2nd); Geometry (3rd)
 655—Walker, George, aged 17, People's College, Sheffield, Clerk—French (3rd)
 974—Walker, John, aged 22, Halifax Working Man's College, Warehouseman—Book-keeping (1st)
 770—Walker, Thomas Ascroft, aged 16, Wigan M.I., Surveyor—Chemistry (2nd)
 539—Walker, William Henry, aged 17, Manchester M.I., Clerk (County Court)—Book-keeping (3rd)
 788—Wallace, James, aged 17—People's Reading Rooms, Belfast, Grocer—Arithmetic (2nd); Algebra (3rd); Mensuration (3rd)
 790—Wallace, James, aged 19, Glasgow Inst., Clerk—Latin and Roman History (2nd)
 521—Warburton, Hugh Houlst, aged 22, Manchester M.I., Salesman—Book-keeping (1st)
 81—Ward, Samson, aged 19, Bradford M.I., Woolsorter—English History (3rd)
 26—Ward, Thomas, aged 19, Banbury M.I., Commercial Clerk—Book-keeping (1st); Animal Physiology (3rd)
 794—Warden, Robert, aged 18, Glasgow Inst., Assistant Teacher—Arithmetic (2nd); Algebra (2nd); Latin and Roman History (2nd)
 609—Warlow, Robert George, aged 21, Pembroke Dock M.I., Shipwright—Book-keeping (3rd)
 501—Warren, Jane, aged 21, Macclesfield Useful Knowledge Society, Dressmaker—Domestic Economy (2nd)
 423—Waters, Thomas James, aged 19, Polytechnic Inst., Engineer—Practical Mechanics (2nd); Geometry (2nd)
 405—Waters, William, aged 16, London M.I., Clerk—English History (3rd)
 931—Watson, James, aged 18, Glasgow M.I., Clerk—Arithmetic (2nd)
 485—Watson, Thomas, aged 27, Liverpool Collegiate Institution, Clerk—Book-keeping (2nd)
 199—Watt, Robert, jun., aged 23, Glasgow Athenæum, Clerk—Book-keeping (1st)
 358—Webb, Charles William, aged 20, City of London College, Clerk—Book-keeping (1st)
 869—Webster, James, aged 21, Aberdeen M.I., Clerk—Algebra (2nd); Principles of Mechanics (3rd)
 383—Webster, Richard Godfrey, aged 17, City of London College, Watch Manufacturer—Arithmetic (3rd)
 9—Weightman, William, aged 17, Ashford S.E. Railway M.I., Railway Clerk—Book-keeping (2nd)
 854—Whittaker, Arthur Baines, aged 16, Halifax W. M. Coll., Meter Inspector—Chemistry (3rd)
 390—White, Frederick Thomas, aged 22, City of London College, Warehouseman—Music (2nd)
 672—White, George Richmond, aged 18, St. Mary's School, Southampton, Pupil Teacher—English History (2nd); Geography (2nd)
 174—White, Henry George, aged 20, Devonport M.I., Shipwright Apprentice—Arithmetic (1st); Book-keeping (1st); Algebra (1st), with 1st Prize.
 172—White, William Henry, aged 17, Devonport M.I., Shipwright Apprentice—English History (2nd); Algebra (1st); Geography (2nd)
 781—Whitfield, John Edward, aged 16, York Inst., Engine Fitter—Arithmetic (3rd); English History (3rd); Geography (3rd)
 466—Whitley, John Robinson, aged 18, Leeds M.I., Brass Founder—German (3rd)
 531—Whitlow, William Henry, aged 20, Manchester M.I., Warehouseman—Book-keeping (1st)
 135—Whittaker, John, aged 16, Burnley M.I., Worker in Warehouse—Arithmetic (2nd); English History (1st), with Prize of Books to the value of £1
 290—Whymont, George, aged 22, Harrison-road Young Men's Society, Halifax, Clerk—Arithmetic (3rd); Book-keeping (1st)
 872—Wight, James, aged 16, Aberdeen M.I., Clerk—Arithmetic (3rd); English History (1st) with third Prize
 745—Wilcock, Samuel Bradley, aged 29, Thirsk M.I., Railway Agent—Logic and Mental Science (2nd)
 976—Wilkinson, Isaac, aged 20, Halifax Working Man's Coll., Assistant Teacher—Arithmetic (2nd)
 140—Wilkinson, James Moore, aged 16, Bury Athenæum, Pupil Teacher—French (3rd)
 76—Wilkinson, Swaine, aged 20, Bradford M.I., Warehouseman—Arithmetic (2nd); English History (3rd); Geography (2nd)
 623—Williamson, Ezekiel, aged 19, Salford Working Men's College, Warehouseman—Mining and Metallurgy (2nd); Chemistry (3rd)
 813—Williamson, John, aged 22, Glasgow Inst., Wood Carver—Freehand Drawing (3rd)
 129—Williamson, William, aged 20, Burnley Mechanics' Inst., Mechanic—Practical Mechanics (2nd)
 100—Willway, Henry Phillips, aged 23, Bristol Trade School, Dyer—Chemistry (2nd)
 778—Wilson, Edwin, aged 23, York Inst., Hosier—Arithmetic (2nd)
 507—Wilson, John, aged 18, Manchester M.I., Solicitor's Clerk—Book-keeping (2nd)
 260—Wilson, Robert, aged 17, Popular Evening Classes, Andersonian University, Glasgow, Merchant's Clerk—French (3rd)

- 772—Wiltshire, Henry, aged 25, Hanley Castle Inst., Farmer—Agriculture (2nd).
 467—Windsor, James, aged 16, Leeds M.I.—English History (2nd)
 518—Winkfield, Frederic Atmore, aged 19, Manchester M.I., Valuer's Assistant—Mechanical Drawing (2nd); Animal Physiology (3rd)
 664—Wish, George, aged 16, People's College, Sheffield, Clerk—Arithmetic (3rd)
 765—Wood, James Lee, aged 19, Wigan M.I., Railway Clerk—Arithmetic (2nd); Book-keeping (1st)
 566—Wood, John, aged 23, Newcastle-on-Tyne M.I., Warehouseman—Book-keeping (1st)
 329—Wood, Joseph Mallinson, aged 18, Leeds Young Men's Christian Association, Clerk—Book-keeping (1st)
 380—Woodard, James, aged 23, City of London College, Tutor—Book-keeping (1st)
 35—Woodbridge, Albert Frederick, aged 21, Birmingham and Midland Inst., Teacher of the Deaf and Dumb—Free-hand Drawing (3rd)
 11—Woodland, Richard, aged 19, Ashford S.E. Railway M.I., Railway Clerk—Algebra (3rd)
 86—Woodman, Samuel James, aged 19, Portsea Watt Institute, Engineer's Apprentice—Book-keeping (3rd); Practical Mechanics (2nd); Mensuration (2nd)
 39—Woodward, Charles Josiah, aged 23, Birmingham and Midland Institute, Curator and Chemical Assistant—Algebra (3rd)
 235—Wright, Alexander M., aged 19, Glasgow Athenæum Clerk—Book-keeping (1st)
 295—Wright, Benjamin, aged 20, Harrison Road Young Men's Society, Halifax, Book-keeper—Book-keeping (1st)
 91—Wright, Emily Terrett, aged 17, Bristol Athenæum—French (2nd)
 583—Wright, George, aged 19, Oldham Lyceum, Book-keeper—Arithmetic (2nd)
 476—Wright, Samuel, aged 18, Wilsden M.I., Carding Engine Tender—Arithmetic (3rd); Book-keeping (2nd); Mensuration (3rd)
 90—Wright, Sarah Hartland, aged 19, Bristol Athenæum—French (3rd)
 151—Wright, William, aged 19, Carlisle M.I., Draper's Apprentice—Arithmetic (3rd)
 580—Wright, William, aged 18, Nottingham M.I., Pupil Teacher—Arithmetic (3rd); Geography (2nd)
 837—Wrightson, George, aged 17, Newcastle-on-Tyne M.I., Clerk—Chemistry (1st)
 553—Wynn, Geo., aged 23, Newcastle-on-Tyne Church Institute, Certificated Teacher—Geometry (3rd); Music (2nd)
 679—Wynn, William, aged 17, Wolverhampton W. M. Coll., Clerk—Book-keeping (1st)
 700—Yates, Frederick, aged 24, Wolverhampton Young Men's Christian Inst., Clerk—Animal Physiology (2nd)
 239—Young, Andrew, aged 19, Glasgow Athenæum, Clerk—Arithmetic (1st); English History (1st) with Prize of Books to the value of £1
 689—Young, Hannah Eliza, aged 23, Wolverhampton Young Men's Christian Inst., Schoolmistress—Arithmetic (2nd); Music (2nd)
 238—Young, Robert, aged 18, Glasgow Athenæum, Clerk—English History (3rd); Political and Social Economy (3rd)

MEETINGS FOR THE ENSUING WEEK.

- TUES. ...Medical and Chirurgical, 8½.
 Zoological, 9.
 WED. ...Society of Arts, 4. Annual General Meeting.
 Royal Soc. of Literature, 4½.
 THURS. ...Philological, 8.
 Royal Society Club, 6. Annual Meeting.
 SAT.Royal Botanic.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, June 13th, 1862.]

Dated 25th February, 1862.

508. C. W. Heckethorn, St. Ann's-road, Brixton—Imp. in obtaining and applying motive power by means of a wheel containing mercury.

Dated 7th March, 1862.

611. J. Carpendale and T. Middleton, Sheffield—Imp. in means of producing raised chasing on copper, silver, and Britannia-metal, by the application of pressure.

Dated 9th April, 1862.

1013. J. Jones, jun., Ship-yard, Sefton-street, Liverpool—Imp. in constructing and arming ships and vessels.

Dated 15th April, 1862.

1084. A. V. Newton, 66, Chancery-lane—Imp. in the manufacture of blasting powder. (A com.)

Dated 25th April, 1862.

1223. E. A. L. Negretti and J. W. Zambra, Hatton-garden—Imp. in the construction of mercurial minimum thermometers.

Dated 26th April, 1862.

1238. A. V. Newton, 66, Chancery-lane—Imp. in the manufacture of hollow glass ware. (A com.)

Dated 29th April, 1862.

1251. E. Clark, 24, Great George-street, Westminster—Imp. in arches—(A com.)
 1257. D. M. Childs, 481, New Oxford-street—Imp. in steam engines. (A com.)
 1258. D. M. Childs, 481, New Oxford-street—Imp. in reaping and mowing machines.

1259. D. M. Childs, 481, New Oxford-street—Imp. in the means of changing a rotary into a reciprocating and a reciprocating into a rotary movement in machinery. (A com.)

Dated 7th May, 1862.

1361. T. Markland, Hyde—Certain imp. in wearing apparel.

Dated 8th May, 1862.

1376. W. Riddle, Gerrard-street, Islington—Imp. in hydraulic and other presses, and apparatus used therewith, adapted to packing cotton and other fibrous substances.

Dated 10th May, 1862.

1412. J. B. Christofini, Paris—Imp. in tents.

Dated 15th May, 1862.

1463. T. H. Le Mesurier, St. Peter's Port, Guernsey—Imp. in raising sunken vessels and other heavy bodies.

1465. R. Walsham and J. Walsham, Birmingham—A new or improved sleeve tie or fastener.

1467. J. Dicker, Hendon, Middlesex—Imp. in apparatus for the delivery of bags or parcels from railway trains in motion.

1469. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in apparatus for consuming smoke. (A com.)

1473. C. Attwood, Tow Lan Iron Works, Durham—Imp. in the production or manufacture of steel and iron of a steely quality.

1475. I. Baggs, Cambridge-terrace, and W. Simpson, Maidstone—Imp. in treating straw, Spanish grass, and other vegetable fibres, in preparing a bleaching agent for vegetable fibres, and in recovering and treating an alkali resulting from the treatment of the said fibres, and in apparatuses employed therein.

1477. A. Watney, 55, Upper Berkeley-street, Portman-square—Imp. in constructing ships, vessels, and other structures intended to resist shot.

Dated 16th May, 1862.

1479. J. Raiton and T. Raiton, Blackburn—Imp. in warping machines.

1481. R. Fenner, 7, Red Lion-court, Fleet-street—Improved machinery for folding envelopes.

1482. R. Laming, 38, Priory-road, Kilburn, West Hampstead—Imp. in constructing and using electric telegraphs.

1483. C. Binks, Parliament-street, Westminster—Improved methods of and apparatus for treating linseed and other oils and fats.

1485. A. L. Thirion, 4, South-street, Finsbury—Imp. in the construction of railway and other carriages.

1487. D. C. Le Souef, Twickenham—Imp. in embossing metal plates. (A com.)

1489. S. Feberdy, Philadelphia—Imp. in apparatus for knitting ribbed fabrics.

1491. N. Thompson, 15, Abbey-gardens, St. John's wood—Imp. in stoppers or covers suitable for closing bottles, jars, and other similar vessels.

1493. B. Sharpe, Hanwell-park—Imp. in the constructions of ships and vessels, and in masts and spars for the same.
 1495. A. V. Newton, 66, Chancery-lane—Improved machinery applicable to the cutting out of boot and shoe soles, and kindred operations. (A com.)

Dated 17th May, 1862.

1499. E. Tailbonis, 4, South-street, Finsbury—Imp. in rectilinear knitting frames.
 1501. J. Broadley, Saltaire, Yorkshire—Imp. in means or apparatus employed in weaving.
 1503. J. Needham, Piccadilly—Imp. in sheathing or coating iron ships.
 2507. J. C. Gore, Jamaica Plain, U.S.—Imp. in belt shippers.

Dated 19th May, 1862.

1509. J. Eastwood, Blackburn—Imp. in machinery or apparatus for removing and winging banks of thread or yarns, and all kinds of fabrics when saturated with liquid.
 1511. G. Macdonald, Puttorghatta Colgany, Bengal—Improved apparatus for ginning cotton, and for cleaning and preparing fibrous substances, also applicable for cleaning or polishing metal or other substances.
 1513. W. Pickstone, Radcliffe, and T. Mollodew, Oldham—An improved fabric in the nature of a cord or corduroy.
 1515. T. Morris, R. Weare, and E. C. Menckton, 4, Trafalgar-square—Imp. in the means and apparatus for the protection of life and property by the agency of electricity.

Dated 20th May, 1862.

1519. M. A. F. Mennons, 24, Rue de Mont Thabor, Paris—Imp. in the method of and apparatus for applying screw power to the locomotion of railway trains on steep inclines. (A com.)
 1521. W. Naylor, Queen's-road, Dalston—Imp. in forging metals and in power hammers employed therein.
 1522. R. Tallerman and L. A. Tallerman, 131, Bishopsgate-street Without—An improved method of protecting ladies and children's boots and shoes.
 1523. J. Taylor, 13, Fenchurch-buildings, Fenchurch-street—Imp. in abstracting heat from liquids and aeriform fluids, and in apparatus employed therein, and for other purposes.
 1525. E. Fawcett, Birmingham—Imp. in the manufacture of metal tubes, and in machinery to be employed for that purpose.
 1527. J. Kennedy, Whitehaven—Imp. in ship propellers.

Dated 21st May, 1862.

1529. H. B. Barlow, Manchester—Imp. in presses for cotton and other substances. (A com.)
 1531. J. Kennedy, Whitehaven—Imp. in plates for plating and for forming the outside skin of ships and vessels and in protecting the same from fouling and oxidation.
 1533. M. A. Le Bruy Virey, Paris—Imp. in drying and carbonising wood, peat, and other fuel.
 1635. A. Giles, 9, Adelphi-terrace, Strand—Imp. in constructing floating breakwaters.
 1537. H. C. Meyer, Ashford-street, Hoxton—Imp. in the means of stopping or retarding railway and other carriages.

Dated 22nd May, 1862.

1539. J. Oxley, Old St. Pancras-road—Imp. in making wheels, and in the machinery to be employed therein.

Dated 23rd May, 1862.

1556. C. De Bergue, Manchester—Imp. in machinery or apparatus for the manufacture of metal reeds for weaving.
 1558. J. Webster, Birmingham—Imp. in coating and indurating metals.
 1560. E. Moulins, Vals, France—Imp. in apparatus used in weaving.

Dated 25th May, 1862.

1561. G. T. Livesey, South Metropolitan Gas Works, Old Kent-road—Imp. in purifying illuminating gas, and in treating the products obtained in the various processes of purification.
 1563. W. Harrison, J. Harrison, J. Oddie, and W. Parkinson, Blackburn—Certain imp. in machinery for winding, sizing, and weaving.
 1570. J. Taylor, Oldham—Imp. in machinery or apparatus for preparing cotton or other fibrous materials to be spun.
 1576. G. A. Huddart, Brynkir, Carnarvon—Improved means for superheating steam.
 1578. J. B. Holmes, South Parade, Chelsea—Imp. in machinery for digging or cultivating land. (A com.)
 1580. T. D. T. Sparrow, Piccadilly—An arrangement or arrangements for shading street lights, in order to protect or shade the eyes of riders and foot passengers from the dazzling effect of the flames of such lights.

Dated 27th May, 1862.

1531. J. Halliday, Manchester—Imp. in the manufacture of ornamental trimmings.
 1586. H. D. P. Cunningham, Bury-house, Alverstoke, Hants—Imp. in anchors.
 1592. W. Palmer, New York—Imp. in revolving fire-arms.
 1594. G. H. Daw, Threadneedle-street—Imp. in fire-arms.

Dated 28th May, 1862.

1596. H. Eaton, Manchester—Imp. applicable to presses for baling purposes.
 1598. J. Simpson, Hulme, Lancashire—Imp. in machinery or apparatus for cutting or producing "mouldings" upon surfaces of wood or other suitable material.
 1600. C. Cohen, 18, Bury-street—Imp. in walking, umbrellas, and other like sticks.

1602. R. Martindale, Birmingham—Imp. in the manufacture of globes and glasses, more particularly applicable to hydrocarbon and spirit lamps, and also in fastenings for securing the globes or glasses in those and other descriptions of lamps.

1604. H. Saunders and J. H. Mills, Birmingham—Imp. in the manufacture of Venetian blinds and other window blinds, and in apparatus for raising and lowering the same.

1606. R. A. Brooman, 166, Fleet-street—Imp. in circular looms, or machinery for the manufacture of looped or knitted fabrics. (A com.)

Dated 29th May, 1862.

1610. J. Critchley, Manchester—An improved rib fastener for umbrellas and parasols.
 1614. G. Ashton, Heywood—Imp. in dyeing fibrous substances, and in the means or apparatus employed for that purpose.
 1616. W. Perks, jun., Birmingham—An imp. or imps. in metallic sash bars for windows, skylights, hot houses, and other like purposes.

1618. R. Griffiths, 69, Mornington road, Regent's-park—Imp. in marine propellers for ships and boats, and for the sheathing of iron ships with metal sheathing to keep them from fouling.

1622. S. Minton, Woodlands-grove, Isleworth—An improved construction of revolving battery.

Dated 30th May, 1862.

1624. F. Datchy and E. Sabatier, Mortimer-street, Cavendish-square—Improved machinery and process for making pulp for the manufacture of paper and other purposes.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1709. W. Harding, Aldersgate-street—Imp. in the manufacture of bonnet fronts, and in apparatus to be employed therein.—7th June, 1862.
 1712. G. Hasleline, 100, Fleet-street—A new and improved photographic camera. (A com.)—7th June, 1862.

PATENTS SEALED.

[From Gazette, June 13th, 1862.]

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| June 11th. | 3155. D. Chalmers. |
| 3106. R. A. Brooman. | 3156. J. Aitken. |
| 3111. R. Searle. | 3157. W. G. Laws. |
| 3114. W. W. Goldfrey. | 3159. W. H. Tucker. |
| 3119. J. W. Scott. | 3163. J. Dale. |
| 3123. S. B. Hewett. | 3166. R. Scott. |
| 3126. H. J. Olding. | 3173. J. Piddington. |
| 3130. T. Walker. | 3177. J. M. H. A. Taurines. |
| 3131. T. E. Gibson. | 3178. J. Bannehr. |
| 3136. J. Hetherington, T. Webb, and J. Craig. | 3180. W. Betts. |
| 3140. R. A. Brooman. | 3183. E. Scott. |
| 3141. R. A. Brooman. | 3184. J. H. G. Wells. |
| 3143. J. E. Dwyer. | 3206. W. Bennetts. |
| 3148. W. Husband. | 3223. E. B. Sampson. |
| 3151. J. Willis, jun. | 3226. J. Cochrane. |
| 3158. C. Baumann. | 3250. A. Warner. |
| 3163. J. Platt & W. Richardson. | 82. H. Charlton. |
| 3179. C. Pontifex. | 106. W. Gorse. |
| 3238. W. Hawksworth. | 387. R. Hornsby, jun. |
| 177. J. C. Johnson. | 412. R. Bunting. |
| 199. J. Wright. | 478. J. P. D. Camp. |
| June 13th. | 584. F. B. Houghton. |
| 3152. G. P. Vallas. | 593. J. Chubb & H. M. Burton. |
| 3154. W. Borlram and W. S. Harwood. | 737. W. Barber. |
| | 1101. J. Mackay. |

[From Gazette, June 17th, 1862.]

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| June 11th. | 3220. J. F. Harvey. |
| 3190. O. C. Evans. | 3242. T. Bright. |
| 3193. G. Walkland. | 3258. J. B. Payne. |
| 3194. W. Tipple. | 26. F. S. Bellocche and H. Bol-lack. |
| 3199. E. E. Perea. | 102. E. W. Hughes. |
| 3200. R. Wailes. | 182. J. Higgin. |
| 3203. D. C. Le Souef. | 810. T. White. |
| 3207. F. Grimaldi. | 914. J. H. Johnson. |
| 3211. F. Selby. | 1308. J. Tyler. |
| 3212. W. Kempe. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, June 17th, 1862.]

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| June 11th. | 1448. C. Wilkinson. |
| 1417. T. F. Henley. | 1507. M. A. F. Mennons. |
| June 12th. | June 14th. |
| 1493. A. Parkes. | 1456. T. Cattell. |
| 1500. G. T. Bousfield. | 1512. G. C. Grimes. |
| June 13th. | 1517. J. Mills. |
| 1436. E. J. Maumené and V. Rogelet. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, June 17th, 1862.]

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| June 12th. | June 13th. |
| 1355. G. A. Riddell. | 1353. J. Betteley. |
| 1369. H. Mathis. | 1425. R. Kevill. |

Journal of the Society of Arts.

FRIDAY, JUNE 27, 1862.

INTERNATIONAL EXHIBITION OF 1862.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate of £452,100, have been attached to the Deed.

DECLARATION OF THE PRIZES TO EXHIBITORS.

On Friday, the 11th July, a State Ceremonial will take place, when the Prizes Awarded to Exhibitors will be officially declared. The admission to this Ceremonial will be by Season Tickets, and by tickets which, if obtained before the 8th of July, will be 5s. each; if on or after the 8th of July, 7s. 6d.

CONVERSAZIONI.

The second and third Conversazioni of the present season will be held at the South Kensington Museum, on the 9th of July and the 8th of October.

ELEVENTH ANNUAL CONFERENCE.

The Eleventh Annual Conference of the Representatives of the Institutions in Union, and the Local Educational Boards, with the Council of the Society, was held at the Society's House on Monday, the 23rd inst., at 12 o'clock, a.m. Sir Thomas Phillips, F.G.S., Chairman of the Council, presided.

The Report of the Proceedings of the Conference will appear in the next number of the *Journal*.

ONE HUNDRED AND EIGHTH ANNIVERSARY DINNER.

The One Hundred and Eighth Anniversary Dinner of the Society took place in the central refreshment saloon of the International Exhibition, on Tuesday, the 24th inst., the Right Hon. W. E. Gladstone, M.P., Chancellor of the Exchequer, in the chair.

The chairman was supported by Lord Harris, Monsieur Michel Chevalier, Sir Thomas Phillips, Monsieur Arlès Dufour, Vice-Chancellor Sir Wm. Page Wood, the Solicitor-General, the

Chevalier de Schwarz, his Excellency Nazim Bey, the Vicomte de Villa Major, Monsieur F. Fortamps, Sir C. Wentworth Dilke, Bart., Count Waldstein, Sir William Holmes, Sir Joshua Rowe, Archdeacon Lane Freer, Mr. M. H. Marsh, M.P., Mr. W. P. Brown-Westhead, M.P., &c.

The band of the Distins was in attendance.

Grace having been said by ARCHDEACON LANE FREER, The CHAIRMAN said it was hardly necessary for him to say that he was about to follow the familiar and traditional practice in giving, as the first toast of the evening, "The Health of her Most Gracious Majesty." In giving that toast it must not be forgotten that the whole of those present were not Englishmen, yet, although not all Englishmen by birth, he was quite sure they were all Englishmen for the purposes of this toast, for it had been the happy lot of the sovereign of these realms that the fame of her unobtrusive virtues had gone forth throughout the world, and that her admirable character had not only established her in the hearts and affections of her own people, but had positively become a bond of union between the nations of Europe. He was satisfied, therefore, that they would, with the utmost cordiality of sentiment, unite in drinking the toast with all the honours.

The toast was responded to with the utmost loyalty.

The CHAIRMAN said the next toast he had to propose was "The Prince of Wales and the rest of the Royal Family." The calamity which they had all so much occasion to deplore, had, as they knew, interposed a barrier between her Majesty and the interesting events connected with the International Exhibition—a barrier which, unfortunately, had not been, and could not be surmounted. But this had not prevented the younger members of the Royal family from testifying their interest in the Exhibition, nor from availing themselves of the privilege—for it was a privilege to all persons, in whatever rank of society they moved—of inspecting the treasures which it contained. It could not be doubted that they, as they grew in years, would imbibe more and more fully, partly from their own convictions, and partly by reverence for parental tradition, a sense of the value and the importance of these exhibitions. Upon every occasion it was a matter of rejoicing to all her subjects to join with the name of their Sovereign the names of those who constituted the future hope of the country, and more especially had he pleasure in asking them to drink this toast, when they connected those names with the place within which they sat, and the magnificent collection of treasures of industry and art which were under the same roof with themselves.

The toast having been drunk with all the honours,

The CHAIRMAN proposed, as the next toast, "Prosperity to the Society for the Encouragement of Arts, Manufactures, and Commerce." In doing so, he said the toast was one which he trusted, and indeed was sure, would attract a special share of interest and approval. If any one who was ignorant of our country, and who had but just heard of the existence of the Society of Arts, on arriving for the first time in the metropolis, were to pay a visit to the International Exhibition, and witness the stage of development which industry—and they might now begin to say, not only industry, but fine art in connection with industry—had attained, perhaps he would be tempted, as his first thought, to conceive this idea, that in a country that had made such considerable progress, it was of very little consequence whether a Society for the Encouragement of Arts, Manufactures, and Commerce, existed or not. And he (the Chairman) for one was free to say, that if they were to contemplate the foundation of such a Society in the year 1862, no doubt it would be true that the relative importance of an institution of this kind was far less now than at former periods. But if they wished to appreciate the merits of this Society—if they wished to measure its performances, they must not look at the harvest only which was now being gathered, but they must go back to

the day when the seed was sown, perhaps in wintry weather, with little encouragement, and with little hope by those who felt that they had an important purpose, beneficial to mankind, to accomplish, and who were determined to the best of their power to give effect to that purpose, whether the circumstances of the moment were propitious or whether they were not. It was now, he believed, more than a century—if they were to be exact it was one hundred and eight years—since this Society took its origin. Let them go back to the state of things which then prevailed in this country. It was a period which, perhaps he might say, was distinguished by a remarkable stagnation in most of what pertained to Art, and in all of what pertained to Industry. A great epoch was about to arrive at the commencement of the reign of George III., but just one hundred and eight years ago was a dark period in the state of this country, so far as regarded all the objects to which this Society determined to devote itself—he meant the encouragement either of Art, or Manufacture, or Commerce. The population of England had long been almost stationary; a constant succession of wars had retarded the growth of wealth; the roads and communications of the country had scarcely begun to be improved, the spirit of improvement was a thing almost unknown. We might, indeed, have had some beautiful manufactures, we might, for example, have had a manufacture of porcelain at Chelsea which might still claim fellowship, if not enter into rivalry, with some of the most distinguished manufactories of porcelain in the world. But that was no indication of the progress of art among the people; that was the luxury of a select few. It was by scores, it was, at the most, by hundreds, and scarcely even by hundreds, that those might be counted, who, at that period, either felt an interest or had attained to any proficiency in the application of art and of the principles of beauty to industrial products. It was, therefore, in a dark period that the founders of this Society set themselves to their work; and those who now contemplated with admiration the immense developments which this age had seen, and who regarded with confidence the future progress which would be achieved (because in these developments was contained the promise of the future), must not forget through what difficulties, in their early stage, those developments were accomplished. Let them look back with gratitude and something of reverence to those who must have acted upon a principle applicable to human things as well as to divine—he meant that principle of faith which enabled men, conscious of high and beneficial purposes, to look beyond, and to overcome the difficulties of the moment, and to sow the seed, the fruit of which was to be borne in following and even distant generations. He might also notice, especially with reference to the presence of so many of their foreign friends, that it was to no patronage, to no countenance of the state, to no large profusion—indeed, to no application, whether large or small, of the public treasure, that this Society owed the means by which it had achieved this work. It had been from the first—in its infancy, in its youth, and in its maturity—the spontaneous offspring of private intelligence, and had reflected in its proceedings, as a voluntary institution, all the features of the English character. It was in the field, he believed he might say, the first among the voluntary institutions which had successively risen to take in hand the work of human culture. It existed long before the Royal Academy of Painting and of the sister art; it existed before the Royal Academy of Music; it laboured on for a long time in silence and obscurity: it sought to perform its work, as all sensible and practical men will seek to perform it, not by visionary and unattainable means, but by such means as offered themselves to the hand, and were practicable and capable of application. He believed that giving medals for inventions and discoveries was the principal means by which in its early days it endeavoured to encourage Arts, Manufactures, and Commerce. That was a most useful undertaking on the part of the Society,

because it must be recollected that the enlightened spirit which was now seen so widely and extensively pervading the manufacturers and producers of this country or of other countries, was comparatively the growth of recent years. There had, indeed, been other periods in the history of the world, as, for example, in the little peninsula of Greece, or in Italy, during what might be called the latter part of the middle ages, when such an intimate and practical persuasion prevailed of the union between beauty and utility, as being the twin principles upon which all real excellence must depend. There were in those days such developments of Art, that he had almost said even now we had hardly arrived at the point in which we could compete with them. But they were not now speaking of the history of man, but of the history of the Society of Arts, and he must say, so far as they were enabled to examine the period in which this Society took its rise, it was a time when there was not the public spirit which now prevailed; there was not the power of the application of capital which now existed; there was not the extended and philanthropic benevolence which now, to a great degree, pervaded the industrial system; there was not that sense that the works of industry were intended to be associated with the principles of art, and that beauty and utility, so far from being at war with each other, were in nature itself wedded and allied, and were intended by the Author of Nature to be allied and united in the works of man. But he must not pretend to convey to this assembly a history or even a sketch of the operations of this Society, for there were those present, and those whom he hoped they would hear during the evening, who were far more competent and far better entitled to treat this subject. While dealing with such a subject, all the circumstances under which they were met, and the roof under which they were assembled, led them on from the early history of the Society to consider for a moment its later stage. They met under the roof where were collected together the choicest treasures of the industry of the world, and no inconsiderable portion of the treasures of its Art. And here, along with the name of the Society of Arts, it was impossible that the mind should not be directed to the name of him who was lately its President. The Prince Consort, for whom so many tears of sincere sorrow had been shed, was for a long time the President of this Society, and stood in so intimate a relation to it that the mere name of President would not in the slightest degree suffice to convey an idea of that relation. It was in the bosom of this Society that the Prince Consort happily matured that fertile idea—that great idea—destined to take its place among what might be called the discoveries of the present century, that it was practicable to bring together the members of the various families of men in connection with a collection of the objects of their industry, and by means of these collections to achieve at once the most important industrial and the most important social and moral ends. When first the Prince Consort was called upon, standing in a public position, to describe the intention with which the Exhibition of 1851 had been undertaken, he said it was to become a point from which all future progress should be measured; it was to be a point from which all past progress should be compared; it was to afford an opportunity wherein the various nations of the civilized world, with their various capacities, might bring into faithful and close comparison the merits and defects of each, all of them having something to teach, and all of them something to learn; and, whether they were to teach more, or whether they were to learn more, it was beneficial to all. So it appeared to that enlightened mind—that they should avail themselves of the marvellous and multiplied means of communication that modern science had established, and should apply to themselves that searching discipline which was sure to result from the exposure of their productions to the public eye—the public after all being the best critic—from a comparison of all those fabrics, the products of human industry, so as to

enable each nation, so far as practicable, to develop further its own peculiar excellence and apply a remedy to its own defects. The Exhibition of 1851 served its purpose, and the time that had passed since that had been short, but, even in the eleven years that had elapsed, how remarkable was the progress made, as shown by what had been gathered together under that roof. Each of them himself had the opportunity of judging how far the Prince Consort was warranted in stating that it would be useful to establish a fixed point in that Exhibition of 1851, from which all future progress might be stimulated, and all past progress be measured. Was it not a fact that the minds of all those who, in 1851, directed themselves to the appreciation of what had then been done, spontaneously reverted to that period when they examined the objects now collected? Was it not also a fact that this collection of industrial treasures contained within itself sufficient evidence of progress to warrant the conviction, not only that an immense advance had been made by the industry of civilised man during even this limited period, but likewise that a great impetus has been given, and that a considerable portion of that advance was due to the happy impulse derived from that great comparison first instituted in the year 1851? He believed it was not too much to say that these International Exhibitions had now established themselves as an institution, not in this country alone, but throughout the civilised world; and not only so, but that with the foundation of that institution there would throughout all time be associated, beyond all other names, one illustrious name, which upon that ground alone had made sure its immortality. But he trusted that those who recognised the title to immortality so achieved by the Prince Consort would likewise bear in mind in one sense the humble, but still the true and faithful partner of his labours. The Society of Arts, over which he presided, was his partner either in the conception or in the development and application of this idea, and was entitled to the second place, and to no small share of the honour that belonged to that great conception, and to the manner in which it was carried out. And to have had a share in such a work constituted, he thought, a true title to public gratitude, and was a proof so convincing and demonstrative of the immense usefulness of this Society, as to dispense entirely with the necessity of all attempt at laboured eulogium. The title of the Society, the honour of the Society, the work of the Society, was to be read in the great spectacle for which some 60,000 or 70,000 persons had that day been gathered, and for which, perhaps, as many would gather on every day of the present month, and the months that were to follow. Such a society could not be superannuated. It might be that the world could now dispense with it better than it could have dispensed with it in the days before it had attained to fame, when it was pursuing its useful labours in comparative obscurity, sustained only by the hope of the future; but, at the same time, that which had been useful in former periods would be useful still. This Society, he believed, acting on the practical principles which marked its first inception, would discover for itself new fields of labour, from time to time, according to the exigencies and the opportunities of each successive generation. It now, if he was rightly informed, found a great scope for its utility in promoting the improved education of the working class; and let not that portion of the company who were his own countrymen, conceal it from themselves that although much had been done, much yet remained to do. They were in this important matter of the education, both of the hand and likewise of the eye and of the taste of the working class, still but beginning their career. It was impossible for them to look across the water; it was impossible for them to visit the French court—he would take that as one great and conspicuous instance, because, happily, they were there upon a footing where they could touch these questions without the slightest fear of jealousies being aroused; it was impossible for Englishmen to visit that

court, and see the works of the French, without perceiving the enormous advantage which the present generation of working-men and working-producers derived from the old and long traditional establishment of sound ideas in art and manufacture in that country. It was there that they saw—he would not say in perfection, for doubtless France, like all the rest of mankind, had much to learn, especially from generations that had long gone by—but it was there they saw the effect that was produced when the idea of aiming at true excellence and beauty in the productions of industry had become a familiar idea, part of the patrimony of every man born in the country, drawn in by him with his mother's milk, forming part of the air he breathed, shaping and moulding the tendencies of his mind, and influencing the very muscles of his hand from the moment when he first began to exercise it in work. He thought, therefore, he had to commend the toast he now proposed—"Prosperity to the Society for the Encouragement of Arts, Manufactures, and Commerce," upon this double title—this triple title he might say—the title of what it did in other days without encouragement—the title of what it had been doing in recent days, when its exertions had taken effect and had borne fruit in this magnificent collection of international industry, and the title of what they hoped it would do for Englishmen in promoting henceforth the industrial education of the British workman. This was, he was sure, enough to entitle the Society to their warmest approbation. Most of those present, indeed, had had the opportunity, and had testified by their acts, the interest they felt in its proceedings. For his own part he spoke as one standing outside their circle, but, because he stood outside their circle, he could the more impartially commend this toast to the guests assembled there, and ask their foreign friends to unite with them in cordially drinking prosperity to an institution which had done, which was doing, and which he trusted would do, so much for that progress of industry and free intercourse among the nations of the world, which they were beginning to learn from day to day was not only a power for the increase of wealth and material enjoyment, but was likewise ordained by Providence to be a blessed and a happy instrument for bringing into union the hearts of men, for teaching the nations of the world to know one another, and for accelerating the arrival of that happy day, remote though it yet might be, when, as they trusted, peace would reign among them, and they would learn the arts of strife and discord no more.

The toast was drunk with much enthusiasm.

Sir THOMAS PHILLIPS, F.G.S., Chairman of the Council, said, nothing but the position he held, which rendered it his duty to respond in the name of the Society of Arts to the toast they had just drunk, would have induced him to present himself to their notice at this moment. But it was the duty of the Society, and of himself as their organ on the present occasion, to express their deep gratitude to the right hon. gentleman who occupied the chair, for his presence there that day, and for the magnificent eulogy he had pronounced upon the operations of the Society. It was also his duty, and a gratifying one it was, to express the acknowledgments of the Society to them for the warm manner in which they had received that toast. He hardly felt he ought to occupy their time by any sort of vindication, or rather by any justification of the eulogium pronounced upon the Society of Arts, but he could not help feeling that they would agree to some extent with the right hon. gentleman in the chair, that the Society of Arts, in other times, had done good work, and even in the present day had not been wanting to its old traditions. The encouragement of Arts, Manufactures, and Commerce was its appropriate task, and they would feel, whilst they were in that building at least, that the Society had, in one respect, efficiently discharged its duty, because he could not help feeling they would agree with the observations just made—that International Exhibitions were a prime means of encouraging Arts, Manufactures, and Commerce. They served to make known to the people

of each country the means that existed in other countries for producing, it might be better than they did, the articles they exhibited. It enabled the artisan to compare his own work with the work of other men; and when they remembered the narrow field in which the artisan worked, and the few opportunities that were given him to see the productions of others, an Exhibition like this, which had brought before him producers of all countries, must tend to advance his own knowledge, and to cultivate his own taste. He believed in no respect whatever were these exhibitions of more importance than to the artisan. It was, in fact, by showing him the best works that could be produced in his own specialty that he was enabled to become the best workman in that specialty; therefore it was they looked upon these exhibitions as a means second to none for the accomplishment of that great object. And, undoubtedly, he might say, with modesty on the part of the Society, but with truth—that they owed this Exhibition substantially to the Society of Arts. Let him not be mistaken in claiming for the Society of Arts merits which it did not possess; but in point of fact it was the confidence felt by the public at large in the advice of the Society of Arts in this respect; it was their belief that the Society of Arts was well warranted in recommending them to supply the means whereby this great Exhibition should be brought together; it was the liberality of the English public in answering to the appeal of the Society of Arts; these had been the means by which this noble and magnificent Exhibition had been brought together. He would say no more on the subject of the Exhibition; but their right hon. chairman had referred to another class of duties discharged by the Society of Arts, viz., the encouragement given, now for some years, to the education of the artisan class. He was sure those of them who knew the extent to which intelligence—the extent to which refined taste—had been diffused amongst the working classes during the last few years, could not doubt the importance of that encouragement, and it was the intention of the Society of Arts to go on promoting that object, believing that in so doing they were distinctly promoting the objects for which they were constituted. Their right hon. chairman had alluded to a circumstance which it was hardly possible for anyone connected with the Society of Arts to pass by, viz., the loss of that distinguished Prince who for eighteen years presided over the deliberations of the Society, who gave his counsel when needed, and who, by the remarkable powers of his mind, assisted to make the operations of the Society more generally useful. He did not want to go into figures, but it would show them that the connection of his Royal Highness with the Society was of great, perhaps of incalculable value, when he told them that eighteen years ago the number of members of the Society did not much exceed three hundred, and that at the present moment they were not far below three thousand. The effect of such an alteration in the position of the Society was not to be measured by the addition to its income. It had increased the members greatly in every part of the kingdom, and had given an impetus to the operations of the Society which, he trusted, would not easily be lessened. He might say at this moment it had been an anxious subject of consideration with the Council of the Society how the loss occasioned by the death of His Royal Highness could be supplied. The Council had not yet thought it necessary, or fitting, he might say, to exercise the powers entrusted to them by the Charter, and elect a president. But at the annual meeting which took place on the morrow it would be the duty of the members to fill up this vacancy. It could not be postponed; and he only alluded to the subject to indicate to them that the Council of the Society had been very hopeful that they should hereafter have the benefit of the presidency of a descendant of their illustrious Prince. They believed that at no distant time the Prince of Wales might be induced to occupy the chair which his late father filled with

such distinguished advantage and benefit to the Society. They, however, knew that his Royal Highness was at present a minor, and they could not therefore elect him at the present moment. The Council had therefore determined to recommend that a provisional arrangement should be made for the present, in the hope that at no distant period they might have the benefit of the Prince of Wales' presidency. He had but one subject more to present to them, and that was to convey to them the gratitude of the Society of Arts, for the manner in which foreign nations and the subjects of foreign countries had answered the appeal made to them, with regard to the Exhibition. Nothing, he thought, could show more conclusively the truth of the sentiments to which the right hon. chairman had given expression, viz., the benefits arising from the affectionate intercourse of nations with each other, than the fact that all foreign nations had entered into rivalry with them, just as if they were the subjects of one common country. Every thing had been done by the Juries in the best possible temper, and in the best possible spirit, and he believed there had been no desire except that justice should be done to the candidates from each country, and that he felt would most certainly be done. He had, therefore, to ask them to manifest their sense of the value of the presence of the many distinguished foreigners who were present at their board to-day, by drinking the health of their foreign guests. Many of them had come from great distances. They had prepared, at great cost to themselves, those beautiful specimens of the arts of their several countries which we had an opportunity of admiring under that roof. He asked them, therefore, to drink with the warmth that he was sure they felt for them, "The Health of our Foreign Guests," connecting with that toast the name of Monsieur Michel Chevalier.

The toast was drunk with enthusiastic and protracted cheering.

MONSIEUR MICHEL CHEVALIER returned thanks in the French language. He said: I beg to answer on behalf of all the foreigners here assembled, and am confident that I express their unanimous feeling when I say that we have all of us greatly gained by the intercourse with your nation as jurors or commissioners in this Great Exhibition. We came to this country satisfied that we represented a power, great, indeed, in the present day, that of human industry, which is the power of human intellect and human integrity, and therefore most worthy of honour. We have found that in the British Empire this power enjoys a very large share of veneration and respect, and that it exercises a great influence on the Government. We shall not fail to report this fact, and we hope that it will have a great effect on the march of affairs in our respective countries. Then we have another report to make with regard to the kind, amiable, and splendid reception we have met with. We feel most thankful for it. We shall all of us say to our countrymen, that the English men and English ladies are most distinguished for their manner of showing hospitality; that they must not be spoken of as an isolated or an exclusive nation; that they are the apostles of that creed that all men are brothers, of the same flesh and the same interests. But I must venture to warn you of one danger you are running into. I am afraid that from the report we make to our countrymen there will be a scheme carried on of an invasion from all your neighbours of the continent. Still for this invasion you need not make any warlike preparations; there are no guns nor rifles to be prepared, neither forts nor redoubts; you want only counters to transact business, shops and docks to contain merchandise, and numerous glasses to drink with us our wine at the same table with us. There is some thing else which we shall report, too, and which will be much appreciated all over Europe—all over the civilised world—that is what we have known of the Society of Arts, by which we are so well entertained this evening. The Society of Arts deserves high praise. It

has at least two merits, not small ones. First, it has understood what good taste is, and it spares no exertions to have it diffused amongst the industrial classes. Good taste is in their field of cultivation what the flowers are in a garden or in a park. The other merit of the Society of Arts is to have understood how great a boon for the general welfare are the benefits of instruction in all classes of society, and particularly amongst the working classes. Some forty years ago a French sovereign obtained for himself great eulogium, and made himself popular for an expression he used when inspecting a body of young men brought up to be soldiers. Each of them, said he has a marshal's bâton in his knapsack. The Society of Arts had the same feeling when it encouraged the education of the artisan. It has in that way told the young people in the manufacturing cities—Remember, that if you are studious—if you cultivate your minds and your intellect—if at the same time you are honest and good subjects of the Queen, you may in time be entitled to wealth, and even to all the distinctions that the nation may confer. Such a saying is good to be reported all over the civilised world; and it will be listened to when we say that such has become the practice of the illustrious, powerful, and honoured nation of England.

The CHAIRMAN again rose and said, they were assembled under the roof of a fabric of such vast proportions, and containing such a multitude and diversity of the most beautiful objects, that it seemed as if both the fabric and the collection within it might belong rather to fairy land than to common earth. But although it might be true that the magnificence of the collection and the rapidity with which it was brought together, and with which the fabric had been raised to enclose it, would, perhaps, do credit to a magician, they must bear in mind that all these results had not been achieved without the application of the homely instruments of painstaking and enlightened intelligence. These qualities were represented to them that evening in the persons of those whose health he was about to give, viz., "Her Majesty's Commissioners for the International Exhibition of 1862." He did not believe it was possible for any one, excepting those who had a near and practical view of the character and the working of the immense machinery by which such an Exhibition as this was collected and organised, to conceive what demands it made, not only upon the assiduity and intelligence of a multitude of subordinate operators, but especially upon the assiduity, the intelligence, the temper, the knowledge, and the skill of those who sat at the helm of affairs, and who supplied the motive power by which the whole of this great body was marshalled and set to work. Those were the persons to whom they owed a debt they could not do better than acknowledge by drinking most heartily to the health of the Royal Commissioners for 1862. In 1851 he had himself, as a Commissioner, had some small experience of the nature of those labours. It was enough to enable him to know that it was much more than the language of compliment he used when he said that nothing but the exercise of many great qualities, combined in an unusual degree, could have enabled any body of gentlemen to produce such an exhibition as they now saw within the walls of this building. In drinking their healths and thanking them for what they had done, let them hope that those most promising signs of the increasing multitudes which gathered from day to day to witness the Exhibition would leave upon record that these exhibitions not only achieved great good to the commercial and industrious classes, but were in every sense successful to such a degree as to encourage those who came after to follow the excellent example set by the Royal Commissioners of 1862. In connection with this toast, he begged to give them the name of Sir Wentworth Dilke.

The toast was drunk with cheering.

Sir WENTWORTH DILKE said no one more deeply re-

gretted than he did the unavoidable absence of Earl Granville, who would in more suitable terms have replied to the toast which the right hon. chairman had proposed, and would have thanked them in a manner more suitable to the occasion for the kindly way in which they had received the toast. This was not the occasion, and he was not the person who ought to be called upon to speak as to the various mistakes which no doubt the Commissioners had made in the conduct of this undertaking; but there was one point on which he did feel he was at liberty to say there had been no mistake, viz., that they had prevailed upon exhibitors at home and abroad to produce such a collection as had never before been witnessed in any part of the world; and, with his experience of 1851, he would say it was far surpassed by the present Exhibition. He would not detain them further than to state that this was the first day of great success, because he found the returns on the day on which the Society of Arts honoured the building with their presence showed that there were many thousands more visitors than on any previous occasion. He begged to return his best thanks for the honour they had done him personally, and the Royal Commissioners collectively.

Sir ROUNDELL PALMER (Solicitor-General) said he had been charged with the duty of proposing to them the toast of "The Colonies." They lived in times in which questions were asked about everybody and everything, and they were expected to answer them; and they must all have heard the question asked, "What is the use of our Colonies?" He confessed he had felt that there were many questions which were best answered by asking another question, and he would reply to that question by asking, "What is the use of our national greatness?" No doubt there were a great many answers to be given to that question; but no better answer he thought could be given than this, that the best and chiefest use of our national greatness was to promote the great mission of mankind—to help to subdue and replenish the earth—to help to spread truth, peace, and civilisation throughout the world. It was not in empire, it was not in conquest, it was not in arms so much as in those arts of commerce and peace which they were met there to celebrate, that true greatness consisted, and amongst the triumphs of civilisation, they in England could point to none more worthy of their pride, or more valuable, than the colonies which they had spread over the face of the earth. To plant the foot of man where man had never trodden—to plant our own race, our own arts, our own language, our own religion, to multiply on the earth, and peacefully to benefit ourselves and the world at large—this was, he thought, one of the greatest achievements of which they or any nation could boast, and whatever else might be achieved, there was nothing of which they could be more justly proud than of the colonies. They had also their reward in those colonies, for there were certainly no parts of the world which were better customers for our trade, or helped more to multiply our riches at home. And when they looked around them and saw the contributions the colonies had made to this and to the former Exhibition, they might well be proud of their progress. We at home were engaged in promoting the arts of manufactures and the arts of design, but the colonies were adding most usefully to the raw materials of the earth—those things without which the arts of manufacture and design would languish. In the Exhibition of 1851 our colonies did their part, and did it well; and there was a nobleman sitting at that table (Lord Harris) under whose auspices one of our smallest colonies—the island of Trinidad—at that time greatly distinguished itself by its contributions to that Exhibition. But in the present Exhibition they might be justly proud of the efforts these colonies had made, and of the promise they had given of the high spirit with which they were developing the characteristic features of Englishmen in every quarter of the world. They were

upon this occasion most glad to meet their friends from all countries of the world, and they were not least glad to meet those who represented the honour, the name, and the interests of England in Australia, in Canada, in the West Indies, and wherever the name of Englishman was known.

The toast having been drunk with cheering,

General MACARTHUR, C.B., responded. He said he was but ill-prepared to occupy that position. It would be useless for him to dilate upon the great advantages of the colonies to this country. He would only therefore say that they were important branches of a great trading nation, and that they sought to harmonise their pursuits with all those objects which civilisation aimed at, and to which it hoped to attain. If he were disposed to speak of their material wealth, he would direct attention to the masses of gold which were now exhibited in that great building; but those represented only a small portion of the wealth of the colonies. It was the raw material—the “golden fleece,” that was of the most vital consequence to this country. Fifty years ago a single bale of merino wool, weighing less than fifty pounds, was all that was brought from Australia in one year, whereas at the present time, the importation into England of this material was more than sixty millions of pounds per annum. The industry which this importation created was of immense value to this country, and it was in this way that the colonies became of so much importance. He trusted that all the colonies would perform their parts in the great objects of their being, and he had no doubt that in a few years they would provide a large supply of cotton for the use of this country.

Vice-Chancellor Sir W. PAGE WOOD said he had confided to him a toast, the subject of which had already been alluded to by the Chairman (and no greater disadvantage could a man labour under than in saying that), who had noticed the efforts of the Society of Arts in promoting the education of the people by means of the Institutions in Union with it. The toast to which he had to call their attention was that of the “Institutions in Union,” and he would do so very briefly; but at the same time let him observe, that if the Society of Arts were to stand still for one single moment, its usefulness would be at an end, and therefore, as the Chairman had so ably pointed out, the great claim the Society had upon their attention was not so much in what it had done as in what it yet hoped to do. In the youth of England—he might say in the children of England—must be their hope. He and others were passing away from the scene, but they hoped that those who came after them would maintain that character which England had hitherto maintained as a great industrial and peace-loving nation. They had heard how the Society of Arts did what it could when there was little encouragement, and the advantage of these great corporate bodies was this:—a corporation at all times acted as the fly-wheel of a machine. At the time when there appeared to be a relaxation of force, the corporation accumulated it, and took care that none should be lost, and preserved it for the future. He trusted that would be the case with this Society by the means they had organised for the examination of youth. He would say in two words how that was done. This Society had about three hundred Institutions in connection with it, and they took this course:—Examination papers, prepared by men of the most able and distinguished character in various departments of art and science, were sent round to be answered by all those who, in these Institutions, have the means of voluntary examination; and those who returned the best answers were rewarded with certificates of merit and prizes; and he might tell them that the lamented Prince Consort, feeling anxious to encourage young men to take advantage of these examinations, instituted a prize of twenty-five guineas to the candidates who most distinguished themselves upon four annual occasions. He was also authorised by the Society to state to them that Her Majesty had intimated her intention to continue that prize. Now he might tell them

one anecdote of the working of this system, because he witnessed it, and was, therefore, competent evidence. In one of the great commercial towns, Halifax, he had the happiness of being present when the prizes were distributed to the successful candidates, in a school instituted there by a man who had distinguished himself, upon all occasions, for his devoted attention to the well-being of all in his employ—who had not only built almost a cathedral for his workmen, but had established a Working Men's College, where those prizes could be competed for. He saw the Chairman of the Council, Sir Thomas Phillips, distribute the prizes on one of those occasions, and he (Sir Page Wood) asked what was the result of the prizes, when he found the man who obtained the prize for chemistry was immediately engaged at a high salary by a dyeing firm in Scotland, and the young man who stood highest in book keeping was retained at a high salary by a mercantile firm at Manchester. This was the way the system worked. Those facts were more valuable than any abstract statements. He trusted now, that in carrying into effect and still further developing this educational system, they would be able, like the Royal Academy of Arts and similar institutions to send pupils abroad for instruction. He trusted they would be able, at no distant time, to give some of the pupils those opportunities of advancing themselves in the knowledge and practice of the arts. They had the honour of the presence that evening of Mons. Arlès Dufour, of Lyons, and he had heard from that gentleman that which he took to be a great testimony, viz., that he had observed a marked improvement, and a marked development of increased taste and refinement, in our art productions since 1851. He had also told him that they had in Lyons institutions similar to those with which this Society had connected itself—institutions containing 500 members in the higher, and more in the lower branches of education, and if they persisted in these efforts, they would do something to promote a desire in all nations for true glory. He did not envy the idea of glory which prevailed in France. He would ask all their friends, of every country, to consider more and more in what true glory consisted, and he thought they would find it was not in arms, it was not in the immolation of hecatombs of human victims in honour of some great commander, but in the advancement of all that tends to human happiness, or, what Lord Bacon calls, the “advancement of the glory of God and the welfare of man's estate.”

The toast having been duly honoured,

Mr. J. S. PARKINGTON rose and said he sincerely wished that the acknowledgment of this toast had fallen into worthier hands; but, upon an occasion like this, as upon all others, he remembered that England expected every man to do his duty, and his duty on this occasion was simply to do what he was told. He, therefore, rose with somewhat of reluctance to acknowledge, on behalf of the Institutions in union with the Society of Arts, the toast which had been so eloquently proposed. But, although he acknowledged his inability to do justice to that subject, he must say he yielded to no man in those feelings which were essential to the acknowledgment of such a toast, viz., a thorough appreciation of the benefits conferred, and a hearty gratitude for what they enjoyed in consequence of the fostering hand of the Society of Arts. They had already heard that evening, in more eloquent language than he could hope to utter, of that branch of the operations of the Society of Arts which extended to the question of adult education, and it was by affording help to these Mechanics' Institutes, and Provincial Unions, with one of which he had the honour to be connected, that the great question of national adult education was so greatly and practically advanced by the efforts of this Society. There were now, he was happy to say, no fewer than about three hundred Mechanics' Institutes in union with the Society of Arts. He trusted that number might greatly increase, and that the benefits of those Institutions, great as they were, might be extended, and that the Society of Arts, in its future career, might

look to as great and complete development of its efforts in the cause of adult education, as it now contemplated by its efforts in the promotion of education in Arts. Perhaps it would not be out of place if he were, in few words, to explain to those of their foreign friends who might not have in their own country similar institutions, what a Mechanics' Institution was, and for their benefit he would briefly state that a Mechanics' Institution was an association of artizans for obtaining, for a small subscription, the advantages which, to the rich, were afforded by their colleges, their clubs, or their reading-rooms. They had heard of their universities and schools, but perhaps they might not have heard of that most useful and most important intermediate institution for the benefit of the artizans of the country, called the Mechanics' Institution. It was, moreover, a centre round which the well disposed of that class might rally; it was a fortress for the good to resist the aggressions of evil, it was a most important link in the chain of a life-long education—education, he meant, in its greatest, in its widest and noblest sense—that education which, beginning with the earliest lessons taught by a mother to her infant child, continued stage by stage through the whole period of life, and found its end only in the grave, and its consummation only in eternity. He would conclude his humble acknowledgments for the toast they had done the Institutions in Union the honour to drink, by expressing a hope, in which he had no doubt they would all cordially join, viz.,—that the principle and advantage of union for promoting the useful and the good might be carried out, not only by Mechanics' Institutions, not only by Provincial Unions of educational bodies, not only by members of their Society and contributors and artificers of those wonders with which they were surrounded, but also for peace and mutual improvement by all the nations of the earth.

Mr. M. H. MARSH, M.P., said he had to propose the last toast in the list—the health of their excellent Chairman. He hoped it would be a bumper, as he was sure it ought to be. He wished the duty of proposing it had fallen into the hands of some one more eminent than himself, but he was sure that it could not have fallen into the hands of any one who could propose it with greater pleasure. It so happened that throughout a long life, his right honourable friend and himself had been connected by associations of one kind or another. He well recollected him when at college with himself, and with one who had recently passed away, a victim to his exertions for the welfare of his country. Some of their old colleagues yet survived, and among them Sir George C. Lewis and the Earl of Elgin, but while there were of that number some of great eminence, there were none more successful, none more honest, and none half so eloquent as his right hon. friend in the chair. Of his youth, it might be said in the language of the poet:—

“He spent no time in toys, or play, or wine,
But i' the thoughts of deep philosophy;
Wit, eloquence, and poesy,
Arts which I loved—all these, my friend, were thine.”

It seemed to him that it was peculiarly appropriate that the right hon. gentleman should be chairman on this occasion, for he was himself, in one sense, the soul of the Exhibition, being the representative of free-trade. Honestly and faithfully, from his earliest youth, he had been in love with that great principle. They had heard him describe the beauties of the Great Exhibition; they had heard him speak of the marvels of the French court, but what would be the use of the French court if the products there displayed were stopped by the Custom-house? Luckily, by the great exertions of the Chairman, there was little in that French court which did not enter into this country as free as air. He (Mr. Marsh) looked upon all this as but the beginning of a great end. They were already recognising the value of that great principle in France, and nothing could persuade him but that the solid genius and enterprise of the Scandinavian and Teutonic nations of

Northern and Central Europe must ultimately be brought to the same conclusion. In the Mediterranean a brighter day had dawned upon the people, and the principle recognised there might be extended by their industry and enterprise. As the right hon. gentleman in the chair had done so much to promote the extension of that principle, he was sure they would drink his health with the greatest pleasure.

The toast was drunk with the greatest enthusiasm.

The CHAIRMAN, in acknowledgment, said he could not conscientiously receive the flattering remarks of his friend who proposed his health, nor the thanks which had so cordially been offered him, without stating that in his opinion they had conferred upon him a much greater honour and favour than it was in his power, on the present occasion at least, to confer upon them. They had chosen him for that post upon a night when they made him by their election the spokesman of his country to the representatives of other nations there assembled, and that was an honour to which any man might well aspire, and which he felt gave dignity and importance to the functions he had been endeavouring to discharge as their spokesman. He trusted that he did not misrepresent them when he said to those friends who had gathered with such hearty goodwill from other and distant countries, that all that goodwill was most cordially reciprocated from the bottom of their hearts. When they spoke of peace—when they expressed the hope that these exhibitions, and these collections of men, as well as things from various nations, were likely to promote peace, they did not mean to turn their backs upon the traditions of their forefathers. To whatever nation they belonged, the gallant deeds of those who preceded them would ever have their sympathy and their admiration, and they would recollect with joy the fields in which they had contended for the honour and the safety of their country. But, compatibly with that sentiment, they yet hoped the time was coming and would come when the wounds of bleeding humanity might in some degree be staunching; and with that noble consummation in view—a consummation which commended itself to the heart of every man—a consummation which belonged to the chiefest triumphs of the religion they professed, and with those sentiments in their hearts and mouths, they bade a welcome to their friends. He, as their organ, bade them welcome, and expressed the hope that, upon every occasion, whether here or in Paris, or in any other great centre of human industry and civilization, every occasion upon which these collections were again made and these assemblies of men were brought together, they might be found coming nearer and nearer in heart and feeling; less and less disposed to waste their resources in pursuing the idle and criminal schemes of ambition, and in desolating the world with blood.

ANNUAL GENERAL MEETING.

WEDNESDAY, JUNE 25, 1862.

The Annual General Meeting, for receiving the Council's Report and the Treasurer's statement of the Receipts, Payments, and Expenditure during the past year, and also for the Election of Officers, was held on Wednesday, the 25th inst., at 4 p.m. Sir Thomas Phillips, Chairman of the Council, presided.

The SECRETARY having read the Bye-laws relating to the Annual General Meeting,

The CHAIRMAN said that, by the Bye-laws, he was directed to nominate two Gentlemen to act as Scrutineers of the Ballot for the election of

Officers. He would ask Mr. Robert Temple and Mr. Underdown to undertake that office.

Those gentlemen having consented to act, the Chairman declared the Ballot open. He then called upon the Secretary to read the Annual Report.

Mr. J. H. MURCHISON said he thought it would be better that the Report should be read before members proceeded to ballot.

The SECRETARY read the

ANNUAL REPORT.

The Charter enjoins that the Council shall render to this meeting an account of their labours during the year. In compliance with this regulation, the Council now present the following Report:—

PRESIDENCY OF THE SOCIETY.

The Council feel it to be their first duty to express their deep sense of the great loss the Society has sustained, by the death of its lamented President the Prince Consort, which took place on the 14th of December last. It would ill become the Council on the present occasion to enter into a lengthened eulogium on the virtues and high qualities of the great and good Prince whom they have lost; the Society has already shown its high appreciation of his worth in the address of condolence which was presented to her Majesty in January last; and when the Lord Mayor convened a public meeting for the purpose of promoting a lasting national memorial of his Royal Highness, the Council thought it their duty to vote one thousand guineas to the fund proposed to be raised for that purpose. This act of the Council was unanimously confirmed at a general meeting of the members, specially convened for taking the matter into consideration. Subsequently, another special general meeting was convened, upon a requisition duly signed, in accordance with the bye-laws, when a resolution was passed, cordially approving of the vote of one thousand guineas to the national memorial to his Royal Highness, and also expressing the desire of the Society to have a special memorial of its own, leaving it in the hands of the Council to consider the most appropriate form for that memorial, and to bring the matter before the members at a fitting time. The Council have hitherto refrained from taking any steps for this purpose, feeling, as was expressed in their report to the members on the occasion of the special general meeting, that "at present it is better to support the erection of the national memorial than to engage in any separate memorial which might detract from this greater object." The Council have for the present rather turned their attention to aiding the Lord Mayor in collecting subscriptions for the National Memorial; and with this view they have promoted the formation of a large and influential Committee, which is

actively engaged in this work, and a considerable addition to the fund has been made by this means.

The lamented death of his Royal Highness obliged the Council to consider the course which they ought to adopt with reference to filling up the vacancy occasioned thereby. The course which was most consonant to the feelings of the Council, and, they doubt not, to the feelings of the members at large, was to refrain from the exercise of the power which the charter gives to the Council to fill up provisionally the office of President falling vacant in the interval between two annual meetings. It is now, however, their imperative duty to place on the balloting-list the name of some member of the Society who may be elected President for the ensuing year.

The thoughts of the Council were naturally turned to his Royal Highness the Prince of Wales, and they have reason to hope that at an early period the Society may enjoy the honour and advantage of having his Royal Highness as their President. Under these circumstances, the Council have thought it best to request the Senior Vice-President to allow himself to be placed in nomination to fill the vacant office for the present, and he has undertaken to serve if elected.

INTERNATIONAL EXHIBITION.

The successive reports for the last three years have detailed, for the information of the members the steps which have been taken by the Council for the establishment of the present International Exhibition; and in the last report it was stated that, on the petition of the Society, Her Majesty had been pleased to grant her Royal Charter, incorporating the Commissioners for the Exhibition, and establishing an advantageous connexion between this Society and International Exhibitions, the particulars of which were stated in the report, and that the Commissioners were actively engaged in the prosecution of that great undertaking, with a guarantee deed signed at that time by a large number of individuals, to the amount of £420,900, since increased to £452,100.

The Council have now the gratification of reporting that the Exhibition was formally opened on the 1st of May, by H.R.H. the Duke of Cambridge, K.G., his Grace the Archbishop of Canterbury, the Lord High Chancellor, the Earl of Derby, K.G., the Lord Chamberlain, Viscount Palmerston, K.G., G.C.B., and the Speaker of the House of Commons, acting under a special commission as the representatives of her Most Gracious Majesty the Queen; and that the value of International Exhibitions in promoting Arts, Manufactures, and Commerce, is being proved by the present Exhibition in the most conclusive manner.

JURY REPORTS ON THE EXHIBITION.

The Council have felt the importance o

having some permanent and authoritative record of the Exhibition, and finding that the Decisions of Her Majesty's Commissioners relating to the Juries provided only for the publication of their awards, but not for that of reports descriptive of the progress of industry since the Exhibition of 1851, and that the Commissioners do not contemplate the publication of any extended reports, the Council have undertaken this work with the co-operation of her Majesty's Commissioners and the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of Juries. It is intended that the reports shall be published in royal octavo, to range with the one volume Jury Reports of 1851. The price, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s.; to other persons, 15s. The reports will be published as early in August as possible.

MOSAIC WALL PICTURES.

A proposition having been made to raise sufficient funds to execute two large mosaic pictures, 23 feet high, as experiments for decorating the outside walls of the permanent picture galleries of the International Exhibition building in Cromwell-road, the Council of the Society, seeing that such experiments have a tendency to create a new branch of industry as well as a new style of decoration for architecture in this country, have thought it right to devote 100 guineas from the funds of the Society for the promotion of so desirable an object; and in a few days working designs, after drawings by W. C. Cope, R.A., and J. C. Hook, R.A., will be placed on the outside walls of the Exhibition in Cromwell-road, for the inspection and criticism of artists and the public.

ARTISTIC COPYRIGHT.

The Council have again renewed their efforts to obtain an amended law of Copyright for works of Fine Art. By the Bill of last year, it was proposed to repeal all existing statutes, and to enact one law of Copyright applicable to works of Fine Art generally. That Bill, however, proceeded no further than a first reading. Acting upon the advice of their friends in the legislature, the Council have this year limited the scope of their Bill to the creation of Copyright in paintings, drawings, and photographs, leaving for a future occasion the amendment of the law relating to Copyright in Engravings and Sculpture. The Council were fortunate enough to obtain the valuable assistance of Sir Roundell Palmer, the Solicitor-General, under whose advice the Bill was finally settled, and under whose charge it has passed the House of Commons. The Bill is now under the consideration of a Select Committee of the House of Lords, and there is every reason to hope that the claim of the artist

to due protection for his works will shortly be recognised by the law of this country as it already has been by the laws of most European nations.

THE SOCIETY'S PREMISES.

The members are aware that the Lease of the Society's House expires at Lady-day, 1867. The Council have for some time had under their consideration the propriety of renewing the lease of the premises in the Adelphi. It is well-known that this subject has occupied the attention of successive Councils of the Society, and various plans and localities for its future habitation have been under discussion. There are, however, many reasons in favour of the Society retaining its present situation, as being well adapted for carrying on its operations, and this totally irrespective of any interest which may accrue to the Society in the International Exhibition Buildings under the terms of the Charter constituting the Royal Commissioners for the Exhibition of 1862. The Council have therefore thought it right to accept a renewal of the lease of their premises in the Adelphi, and have agreed with the ground landlord for a lease of thirty years, to commence at the expiration of the existing lease, upon payment of a fine paid down and a rent for the future, which, under the circumstances of the improved value of the property, must be considered a satisfactory arrangement.

CONVERSAZIONI.

The Council thought it right that the Society should make provision this year for extending its hospitality to foreigners and strangers visiting London as Commissioners, Jurors, or otherwise, in connection with the International Exhibition, and they therefore determined to hold three Conversazioni, the first of which took place at the South Kensington Museum on the 3rd of May. The next will take place on the 9th July, and the third on the 8th of October, shortly previous to the close of the Exhibition.

MEDALS.

The Council have pleasure in announcing that they have awarded the following Medals for Papers read at the Evening Meetings:—

To Dr. F. Crace Calvert, F.R.S., for his paper "On Improvements and Progress in Dyeing and Calico-Printing since 1851." *The Society's Silver Medal.*

To E. C. C. Stanford, for his paper "On the Economic Uses of Seaweed." *The Society's Silver Medal.*

To James Morris, for his paper "On Mauritius: its Commercial and Social Bearings." *The Society's Silver Medal.*

EXHIBITION OF INVENTIONS.

The Council have not thought it advisable in the year of the International Exhibition, to have an Exhibition of Inventions.

UNION OF INSTITUTIONS.

For the particulars relating to this branch of

the Society's operations, the Council refer to the Secretary's report* read to the Conference of the Representatives of Institutions on Monday, the 23rd inst., by which it appears that the examinations are gradually extending; a larger number of candidates having been examined in this than in any previous year.

FINANCE.

The Council congratulate the Society on the continued prosperous condition of its finances. An increase has taken place in the number of its members beyond the annual average usually elected. At the first meeting of the Session, in November last, three hundred new members were proposed, and several hundreds have been added since. During the year the Council have received from the Executors of the late Dr. Cantor the one moiety of his residuary estate, bequeathed by the will of that gentleman to the Society, amounting to the sum of £5,042, the whole of which has been invested in India Promissory Notes, bearing interest at 5 per cent. A representation was made to the Council through the Danish Government, that Mrs. Cantor, a Danish lady, upwards of 80 years of age, the mother of Dr. Cantor, residing at Copenhagen, was by the death of her son deprived of the assistance he had been in the habit of affording her, that no provision for her had been made in his will, and that her sole means of support was a small annuity. The Council took the matter into consideration, and after consultation with the governing body of Wellington College, who under Dr. Cantor's will had received the other moiety of his residuary estate, it was agreed that an annuity of £50 a year should be jointly paid by the Society and Wellington College to her for life, and the Council have learnt with pleasure that this arrangement is entirely satisfactory to Mrs. Cantor. The Council have during the year invested £1,250 in Consols, and £362 12s. 2d. in Indian 5 per Cent. Promissory Notes, in addition to the foregoing sum of £5,042. The Council have also been able to pay out of their income the donation of £1,050, voted to the Prince Consort National Memorial Fund; and it will be seen that after the discharge of all the liabilities of the year, and making the investments above named, there remains a balance in favour of the Society of £563 15s. 7d. The particulars appear in the Balance Sheet published in last week's *Journal*.

Mr. MARSH NELSON drew attention to what he considered to be an incorrect mode of drawing up the Society's Financial Statement, and recommended the adoption of some alterations in future years. He also expressed it as his opinion that the cost of the *Journal* was too great, and that the matter contained in it was not sufficiently interesting.

Mr. R. GORDON wished to know how far the Council of the Society was responsible for the course that had been

taken by the National Memorial Committee recently formed at the Society's House, in sending circulars to the clergy and others in reference to the collection of subscriptions.

The CHAIRMAN explained that what had been done was not done by the Society, but by an independent committee, to whom, however, the Council had given every assistance, as stated in the Council's report. He did not concur in the objections taken by Mr. Gordon to the proceedings of this Committee.

Mr. J. H. MURCHISON, in reference to this subject, complained that the Council had called a meeting of persons not members of the Society, and made a report to them, which he considered an irregular proceeding. With regard to the *Journal*, he spoke of some alleged inaccuracies in the reports of speeches at the ordinary meetings, and thought it was generally not well conducted, and did not possess sufficient interest.

Mr. HENRY MAUDSLAY differed entirely from Mr. Murchison on this point. He was in the habit not only of reading the *Journal* himself, but placing it at the disposal of a large number of artisans and others, by whom he could assure them it was constantly read, and appeared to be highly appreciated.

Mr. FREDERICK LAWRENCE hoped that the Council would direct their immediate attention to the question of a special memorial of their late President for the Society, and that when the Prince of Wales occupied that chair, as they all hoped he would do, he would see that the Society had raised a worthy memorial of his illustrious father.

Mr. J. H. MURCHISON expressed his dissent from the views expressed in a paper which had been read at one of the ordinary meetings, tending to show the inutility of prizes as a means of promoting progress in invention and manufactures, and proceeded to read extracts from the Society's *Transactions*, for the purpose of showing the incorrectness of this view.

The CHAIRMAN then put to the meeting that the Council's report be received and adopted, which was carried.

The ballot having remained open one hour, and the scrutineers having reported, the Chairman declared that the following members had been elected to fill the several offices. The names in *italics* are those of members who have not, during the past year, filled the offices to which they have been elected:—

COUNCIL.

PRESIDENT.

William Tooke, F.R.S.

VICE-PRESIDENTS.

Lord Ashburton, F.R.S.

Thomas Bazley, M.P.

W. H. Bodkin.

Sir John P. Boileau, Bart.

The Duke of Buccleuch, K.G.

Harry Chester.

Henry Cole, C.B.

Sir C. Wentworth Dilke, Bt.

John Dillon.

The Earl Granville, K.G.

F.R.S.

William Hawes.

Henry Thomas Hope.

Lord Henry Lennox, M.P.

M. H. Marsh, M.P.

Right Hon. Sir John S.

Pakington, Bart., M.P.

Sir Thomas Phillips, F.G.S.

The Marquis of Salisbury,

K.G.

Thomas Twining.

Lord Westbury.

Vice-Chancellor Sir William

Page Wood, F.R.S.

OTHER MEMBERS OF THE COUNCIL.

John Bell.

Hon. and Rev. Samuel Best.

J. Griffith Frith.

Peter Graham.

Edward Hamilton.

Chandos Wren Hoskyns.

J. C. Macdonald.

William Thomas Mackrell.

Samuel Redgrave.

William Anderson Rose (Al-

derman).

Thomas Sopwith, F.R.S.

Thomas Wickworth.

* This will be published in next week's *Journal*.

TREASURERS.

John Alger. | *George F. Wilson, F.R.S.*

AUDITORS.

G. Dixon Longstaff, M.D. | *W. B. Simpson.*

SECRETARY.

Peter Le Neve Foster, M.A.

FINANCIAL OFFICER.

Samuel Thomas Davenport.

A vote of thanks was then passed to the Chairman, and also one to the scrutineers.

At the conclusion of the General Meeting, a Special Meeting was held, when the following candidates were balloted for, and duly elected members of the Society :—

Barber, John	Clapton, N.E.
Brown, John	Mayor of Sheffield, Shire-hall, Sharrow Head, Sheffield.
Cheale, Alexander	Uckfield, Sussex.
Churchill, Lord Alfred S., M.P.	16, Rutland-gate, S.W., and Athenæum Club, S.W.
Clowes, Francis	Norwich.
Douglas, Robert	23, New Bond-street, W.
Foster, John Alderson ...	Hull.
Hodgson, Arthur	Drayton-park, Middlesex, W.
Hohenbruck, Baron Arthur	3, Gloster-grove West, Brompton, S.W.
Horsley, Charles	20, Wharf-road, City-road, N.
Jacques, Richard M.	9, Earl's-terrace, Kensington, W., and Easby Abbey, Richmond, Yorks.
Kennedy, John	Whitehaven.
Kent, G. Barton	11, Great Marlborough-st., W.
Lawton, John	Marle House, Micklehurst, near Stalybridge.
McConnel, James	Bent-hill, Prestwich, near Manchester.
Morfit, Campbell, M.D.	49, Weymouth-street, Portland-place, W.
Perkin, Thos. Dix	Sudbury, Middlesex, N.W.
Rixon, Alfred H.	7, Pall-mall East, S.W.
Robinson, Francis	48, Conduit-street, Hanover-square, W.
Scott, James	St. John's Grammar School, Hamilton, N.B.
Scovell, George	34, Grosvenor-place, S.W.
Strachan, James	12, Royal-crescent, Notting-hill, W.
Sutton, Edwin	204, Regent-street, W.

ROYAL AGRICULTURAL SOCIETY'S SHOW, AT BATTERSEA.

The attention of members may be directed to the most extensive and complete collection of Agricultural implements and stock which has ever been assembled together, probably in the world. The vigour and vitality which it manifests is a conclusive proof of how much such a collection serves the best interests, both of producer and consumer. It also proves how gradual must be the steps by which it has become possible to make such a collection. It may fairly be reasoned, that if a show can be made International, and of this magnitude, for live agricultural stock and agricultural implements, it only demands the same kind of perseverance which the Royal Agricultural Society has manifested during many years, to create Annual International Exhibitions of other branches of human industry, which would become as useful and suc-

cessful in each respective industry as the present great show is for agriculture.

The show remains open until Wednesday, 2nd of July inclusive, and Battersea-park has proved itself to be an excellent site for the purpose.

EXAMINATIONS, 1862.

The following additions and alterations should be made in the List of Certificates awarded to candidates published in last week's *Journal* :—

- 981—Ardill, Fanny, aged 17, Ladies' Educational Institution, Leeds, Pupil Teacher—Arithmetic (3rd)
 982—Horner, Carolyn, aged 18, Ladies' Educational Institution, Leeds—Arithmetic (3rd)
 980—For "Grant, Apulina," read "Gaunt, Apulina."
 132—Healey, Thomas—after Mensuration, for "(3rd)" read "(2nd)"
 271—After "Jamieson, William Stevens," omit "Arithmetic (3rd)"
 104—After "Parker, Samuel Isaac," omit "Geometrical Drawing (3rd)," he not having come up for examination.
 971—Payne, James, jun.—after Algebra and English History, for "(2nd)" read "(3rd)"; and after Geometrical Drawing and Logic, for "(3rd)" read "(2nd)"
 975—Sutcliffe, Samuel—after Book-keeping, for "(3rd)" read "(2nd)"
 317—Tiffany, John Barnes—after Arithmetic, Algebra, and Geometry, read "(2nd)" instead of "(3rd)"

PHYSICAL TRAINING OF CHILDREN.

On Saturday evening a meeting of the London Association of School-teachers was held at the Radnor-street Schools, City-road, to hear a lecture given by Dr. M. Roth upon scientific physical education. EDWIN CHADWICK, Esq., C.B., in the chair.

Dr. Roth, after expounding some of the elementary principles of physiology, which he illustrated in a manner to call forth much applause, by large anatomical drawings and models in papier-mâché, proceeded to declare that these principles were violated in a common school teaching with disastrous results, in lowering the power and spreading disease amongst the population. Such mental acquisitions as were imparted were undoubtedly imparted at the expense of much physical deterioration. Seated on such inconvenient benches as were before him, crowded together very frequently so as to confine the arms and the whole body; kept sitting, often with weak spinal columns without any support; kept sitting there for hours in painful constraint, or kept bent over lessons in most injurious positions; kept for periods of time which were now proved to be beyond the infantile capacity of profitable attention, and that, too, in overcrowded and ill-ventilated rooms, was it surprising that schools were so frequently the sources of epidemic disease? As an example of improvement required in details, there was in the International Exhibition an improved child's school seat, which gave the support of a desk for writing, and that desk turned over gave the support which was often needed for long sitting. As founded on the principles of our nature, he was an advocate for the principle of the half school time system, or of alternate industrial and physical exercise with mental exercises properly graduated and systematised. He then described a number of these elementary exercises. These would serve to prepare the way for the military drill, which, as taught in this country, was very defective in itself, and greatly required the light of physiological science for its amendment. The commencement of improvement should be by the application of physiological science at the training colleges.

The CHAIRMAN said it gave him great pleasure to ob-

serve that the schoolmasters invited a lecture on this subject, which was highly important to many of themselves as well as to their pupils. He anticipated that when statistical returns as to the causes of death belonging to occupations were obtained, it would be found that some ten years' loss of life was occasioned to the class of elementary school teachers by preventible conditions of excessive sedentary occupation in impure air. Where physical exercises, combined with reduced periods of sedentary constraint, with good ventilation and with personal cleanliness, had been introduced, the health of children had been advanced to an extent which to many would seem marvellous, and large classes of diseases deemed inevitable as "children's diseases" had been abolished. At Paris there was a large hospital for children. Mere medical treatment alone was found insufficient for their restoration, and a gymnasium had been added to it, and special exercises provided, with great success. They might see a beautiful model of this school gymnasium in the upper part of the French court in the International Exhibition. In it were models of children in exercise, with specimens of the apparatus in use, which were deserving of their attention. He had stated, as a deduction from the evidence of employers of labour, that four drilled youths or four drilled men were as efficient as five undrilled men for ordinary labour in civil life; that the general introduction of the military drill in schools would add at the least one-fifth to the efficiency of the labour of the general population. But the French professor of the gymnasium to which he had directed attention had declared to him that by systematic gymnastics, in addition to the ordinary drill, three persons were made equal in strength and efficiency in the direction of their labour in civil life to five of the ordinary population. School teachers, where the military drill had been introduced, and exercises interspersed with the lessons, bore testimony to the fact that the mental vigour of the school had been improved by them. One unexpected minor economy had been obtained, which would compensate in itself for teaching the drill. A schoolmaster who had been taught the drill about a year said he found that it had already saved him a pair of shoes, and he had no doubt it would save him a pair of shoes a year for the rest of his life, as well as each of his pupils, by the more even tread and wear of the shoe. The drill sergeants pointed out also the saving of the trousers from less splashing of dirt and kicking, as well as the saving of the shoes, obtained by training. They pointed out also the attainment of greater distances, with the same amount of fatigue in walking, by their pupils in after life. These economies were undoubted, and were not to be despised for civil life. Lord Elcho had given notice of his intention to bring under the notice of Parliament the large public economies obtainable by the general introduction of the military drill as part of systematic physical training in elementary schools.

A long discussion amongst the school teachers followed, in which several of them recited their own experience of the beneficial effects of gymnastic exercises. But it was complained, as a matter which required redress, that the last revised code was so framed as to exclude physical training, and to frustrate trials of the half-time system. It was also complained that they had no pecuniary means of obtaining the necessary appliances and accommodation.

Mr. LANGRAN, of the Borough-road school, stated that they had the military drill in their school, which was so necessary for the movement of the classes that he did not know how he could get on without them. He did not see his way to the adoption of the half-time plan advocated by the chairman, of three-hour lessons and three hours' gymnastic exercises. He did not think boys would like to lose their games.

The CHAIRMAN said he did not contend for a fixed provision for all cases; he was for the introduction of physical training, and for a better adjustment of the mental effort to the mental capacities, which would vary with ages and conditions. He should not like that boys should lose any

of their games, and should like that they should have in towns more and better than those they now had.

Thanks were voted to Dr. Roth and to the chairman, and the meeting separated, it being understood that the subject was to be further prosecuted in connexion with the question of public education.

SHEFFIELD SCHOOL OF PRACTICAL SCIENCE AND METALLURGY.

The following is a statement of the arrangements which have been made by the Executive Committee, and of the nature of the scheme of education which it is intended to adopt in this school:—

The idea of establishing a school for the instruction in practical science of young men who are destined to become engineers, civil, mechanical, or mining, or managers of manufacturing works of any kind, was put forward by the Rev. G. B. Atkinson, Principal of the Collegiate Schools, who urged the great want of such a school, and gave a plan by which one might easily and inexpensively be established. The main features of this plan were the following:—The use of some portions of the buildings of the Collegiate School was offered by Mr. Atkinson. These buildings are well suited for the purpose, and include a most excellent laboratory. A professional engineer was to be engaged to take charge of the more technical portion of the instruction; and Mr. Atkinson considered that with this addition the ordinary staff of the Collegiate School would be amply sufficient until the School of Science had grown to large dimensions. Mineralogical and Geological collections were to be set on foot, and an industrial museum was to be gradually formed. This School of Science, however, although under the same roof with the present Collegiate School, was, as a school, to be entirely distinct. The conditions of admission were to be such as would render it open to all classes and denominations.

A meeting was called by the Mayor, at which this scheme was considered; its general principles were approved, and a Committee was formed, who were charged with the duty of arranging details and taking the necessary steps to carry it into effect. The following are the names of the Committee:—Executive.—The Mayor (J. Brown Esq.), The Master Cutler (G. Wilkinson, Esq.), William Baker, Esq., F.C.S., Associate of the Government School of Mines, C. H. B. Hambly, Esq., F.C.S., F.G.S., Robert Jackson, Esq., Rev. J. B. Paton. M.A., Edward Sanderson, Esq., F.R.S. General.—The gentlemen constituting the Executive Committee and the following:—Charles Atkinson, Esq., Samuel Butcher, Esq., Charles Cammell, Esq., Thomas Dunn, Esq., R. J. Gainsford, Esq., Thomas Jessop, Esq., W. A. Matthews, Esq., Rev. Canon Sale, D.D., Graham Stuart, Esq., F.C.S., Henry Vickers, Esq., Thomas Vickers Esq., Bernard Wake, Esq.

Meetings of the Committee have been held and the whole subject has been thoroughly considered; and the result has been that, as a temporary expedient for giving the school a start, the scheme of Mr. Atkinson has been unanimously adopted. It is hoped that in a few years it will have grown to a size which will render necessary an independent building on a large scale.

The following is a brief outline of the plan of instruction. The complete course extends over three years, and will fully occupy the whole time of a student during this period. It comprises the following subjects:—Mathematics, Natural Philosophy, Chemistry, Mineralogy, Geology, Mining, Metallurgy, Civil Engineering, Mechanical Drawing, Technology, &c. Students who have attended the complete course, and passed the final examination in the first class, will be entitled to a certificate of proficiency, with the title of Associate of the Sheffield School of Practical Science and Metallurgy. They will be entitled for life to have access to the museum, and to all the courses of lectures. Students, however, who cannot de-

vote their whole time to the school, may attend one or more of the courses of lectures. Upon passing, with credit, an examination in any subject, they will be entitled to a certificate of proficiency in that subject.

Courses of evening lectures are to be given to working men. The situation of the Collegiate School not being favourable for these lectures, an appropriate building has been sought in a central situation. Two offers of lecture rooms have been made; one of rooms in the Milk-street School; the other of a room which is about to be built for purposes of the kind in Gower-street. The Committee have decided to accept both these offers. The educational staff necessary to carry out the proposed scheme will consist of the Rev. G. B. Atkinson, Dr. James Allan, a professional engineer, and a teacher of mechanical drawing. The school is expected to be ultimately self-supporting. This, however, cannot of course be the case until it has been working for some time; and it will therefore be necessary to raise funds to cover the expenses until it is so. It is proposed in the first instance to raise funds sufficient to carry on the school for three years. It is calculated that the amount required will be, for the first year £500, and for each succeeding year, £400. Of this about £300 per annum will be required for salaries. It is proposed to raise this fund by subscription; it will be of the nature of a guarantee fund, and will be subject to reduction by a proportion of the fees paid by students. This proportion of the fees will form a certain per centage on the expenses; and a reduction at that rate will be made on the sum guaranteed by each person.

Subscribers (not being students) of £1 and upwards will be admitted, without charge, to any of the lectures. The management of the funds will be in the hands of the Executive Committee, who will publish an annual balance sheet. A sub-committee, consisting of the following gentlemen, has been appointed to undertake the collection of the requisite funds:—W. Baker, Esq., F.C.S., C. H. B. Hambly, Esq., F.C.S., Rev. J. B. Paton, M.A., H. C. Sorby, Esq., F.R.S.

The following are the fees chargeable to students:—Matriculated Students, passing through the regular course, 20 guineas per annum. Composition fee, for the whole course of three years, payable at entry, 45 guineas. These fees are exclusive of the fees for laboratory practice.

The fees for the separate courses of lectures for occasional students are:—Mathematics, seven lectures a week, 5 guineas each term. Chemistry, course of 100 lectures, 5 guineas. Civil Engineering, 4 guineas each term. Principles of Mechanism, 1 guinea each term. Mineralogy, 1 guinea each term. Geology, 1 guinea each term. Mechanical Drawing, 1½ guinea each term. Laboratory Practice, Chemistry, one whole day each week, 4 guineas each term; two whole days each week, 7 guineas each term; three whole days, 12 guineas each term. Laboratory Practice, Metallurgy, one whole day each week, 4½ guineas each term; two whole days each week, 8 guineas each term; three whole days each week, 14 guineas each term.

The charge for admission to the Lectures to working men will be 2d. each lecture.

Home Correspondence.

THE PATENT LAW.

SIR,—Mr. Reveley states that my communication, inserted in the *Journal* of May 16th, p. 444, “confirms and corroborates every position assumed by him in regard to the Law of Patent Right.” Judgment being thus unhesitatingly pronounced, I have nothing left to do but to carry on my appeal to public opinion through the *Society's Journal*, in doing which I will now notice his last statements of the errors he says I have fallen into. Thus, he

states that I “assert” that Sir William Armstrong “found out” the same thing with regard to ordnance as himself; and this conveys, I think, the idea that I affirm as a fact that Sir W. Armstrong truly invented the same thing by excogitation of the brain, whereas I merely, in passing, stated that he had “found out,” meaning that he had, by some means or other, arrived at the same goal. I would not “affirm” of anyone that he had invented anything, as I consider this is testimony that must come from the inventor alone.

Mr. Reveley's statements about my errors, in supposing the Government had forgotten him, and about his capacity for bearing its “badgering,” are, after all, little to the purpose of the discussion; but his remarks as to his not being inclined to take a “patent-right lottery-ticket,” and as to his not having fully developed his invention by making the required piece of ordnance, and to his method of (as he supposes) acquiring a *status* by communicating his invention to the Ordnance Committee, only tend to confirm my view of his case; for could he or any one else, seeing that the laws and institutions of the community to which he belongs prescribe the “patent-right lottery-ticket,” as he terms it, as the method by which he is to be recorded as having a vested right in an invention, suppose in fairness, that when it does not suit him to avail himself thereof, he ought still to obtain the benefits which would be conferred thereby—that is, claim a prize in the lottery without taking out a lottery-ticket. Further, notwithstanding Mr. Reveley's assertion that he duly obtained a *status*, still it must be apparent to all that he did not obtain that *status* which induced him to go on, or which would have enabled him to induce others to go on, and develop his invention by making a full-sized piece of ordnance. It will be also apparent that he obtained no legal *status* so as to gain a property in his invention; otherwise, he might now have enforced his claim against Sir W. Armstrong, by legal process.

I have mixed with inventors, and been conversant with men of business for nearly 25 years to no purpose, if my opinion is fallacious that men will never be induced to exercise ingenuity and expend time and money in inventing, perfecting, and practically developing improvements on the chance of succeeding in the unticketed lottery of the uncertain action of governmental appreciation or public gratitude (this last being generally reserved till after death). Even if some inventor, brimful of patriotism or enthusiasm, shall occasionally do all this for the offspring of his own brain, I feel confident he will never get the aid of the capitalist, when he is unable to offer a share in a legalised property such as may give promise of marketable value.

And to return to Mr. Reveley's first communication in the *Journal* of May 9, page 416, I conceive that, in the case of Watt's great invention instanced therein, Mr. Boulton, the partner of Watt, would not have expended his large capital had he been sure that no exclusive property could have been held in Watt's invention.

I am ready to admit that all that Mr. Reveley says against patent law, as far as it refers to the present practice, is without doubt too true, and that in consequence of its defective state inventors do very often fail to obtain the benefits they have a right to expect, but this, I maintain, is no fault of the principles of the system of according patent-rights, but is the direct consequence of defective details. I do most strenuously affirm that the system of erecting vested rights in inventions, so as to ensure the full and systematic recording of inventions, and promote the practical development thereof in the commercial sense, provided the vested right be temporary and not perpetual, is equitable and sound public policy, as much as in the cases of the possession of landed property and property in goods and chattels.

The question is, indeed, one of the merest commonsense and common justice. Is it just and expedient that I should be able to obtain vested rights in any and all products of my labour, whether mental or corporeal, when-

ever or wherever it is possible to make the results of such labour the subject-matter of such rights? And this is allowed to be good if I compose a new literary or dramatic work, or piece of music; if I establish a good-will in trade, or have an acknowledged trade-mark, or make a new ornamental design, as well as if I do a piece of carpentry-work, or erect a building—for hereby industry and improvement will certainly be promoted to an extent that can never be effected without these rights, except, perhaps, in the days of the millenium, when property rights, laws, and constables will be wholly superseded.

I am, &c., F. W. CAMPIN.

London, June 19, 1862.

THE GRAVITY ESCAPEMENT.

SIR,—Some few years since you published the description of Mr. Denison's Gravity Escapement,* perhaps the following observations on the same subject may not be unacceptable.

The gravity escapement appears to have been a peculiar object of interest to horologists since the days of Cummins, and it is singular that the improvements which have taken place in its construction have been invented by amateurs. Mr. Bloxam was the first to make any great step in advance. Mr. Denison advantageously changed the form and arrangement of Mr. Bloxam's, and introduced the valuable addition of a fly.

All gravity escapements have hitherto been constructed on the principle that the pin lifts the same pallet on which the tooth drops. In the following escapement, which I call the Pin-wheel Gravity Escapement, the opposite pallet is lifted to that on which the tooth falls, consequently it is impossible to trip if ten or twenty times the weight be applied.

Fig. 1.

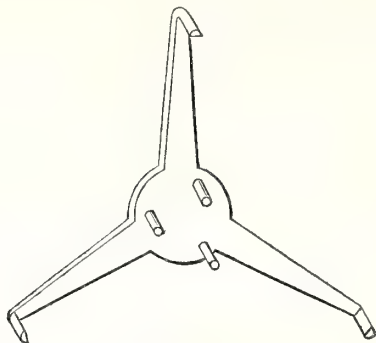
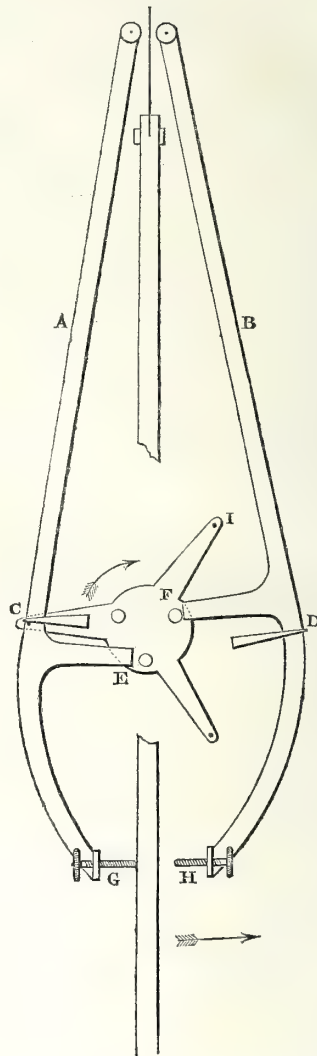


Figure 1 is the three-legged wheel, but instead of having a tooth at the end of each leg, as in Mr. Denison's, there is a semi-cylindrical pin, with the flat side turned towards the centre. Now in Mr. Denison's, the pin raises the pallet, and the long tooth immediately drops on the stop of the same pallet, whereas, in my escapement, the inner pin lifts the opposite pallet to that on which the pin of the leg falls.

In Figure 2 the pendulum is advancing in the direction of the arrow, propelled by the weight of the pallet A, in contact at G. The pallet B is held up by one of the inner pins at F, and one of the semi-cylindrical pins at the end of the leg is pressing on the stop at C, behind the dotted leg as here shown. When the pendulum has travelled sufficiently far the leg pin escapes outside the stop C (not inside, as in Mr. Denison's), the wheel then turns in the direction of the arrow, the pin at E raises the pallet A, at the same instant the pin at F releases the pallet B, which is now in contact with the pendulum at H, and gives the impulse by gravity during the pendulum's

return, while the leg pin at I is resting on the stop D. The pallet A is stopped by a banking pin at the moment the pendulum takes up the pallet B. The same action then takes place on the opposite side. The acting sur-

Fig. 2.



faces at C and D are struck in a circle from the pivots by which the pallets are suspended, and if intended to go without oil, should be jewelled. It can be made with six legs, but I have put three for simplicity of explanation. The inner pins should be set at an angle of 30° in advance of the outer pins. It should be noticed, as a peculiar feature of this escapement, that the pendulum does not unlock the wheel, but that the pallet, by its own gravity, allows it to escape. The impulse is divided equally during the ascent of the pendulum after zero, and its descent before it—a principle which Professor Airy has shown to be essential to good time-keeping, and as the pin slides on the dead face of the stop, as long, or rather longer, than in the dead-beat escapement, it indeed appears to me to combine the principle of Grahame's with that of the gravity escapement.

I am, &c.,

R. WEBSTER.

* See *Journal*, Vol. II., pp. 133 and 749.

A NEW PROJECTILE FORCE.

SIR,—I perceive at line 20, page 460, 2nd col. I should have corrected the MSS. The following should have been the words used, "omits the cost of acid, the item of zinc being that upon, &c."

If only one acid were to be used, as in a single-cell battery, the cost for each cell would be little, but the intensity is so small in these batteries, that a great many must be employed to decompose water, and if the porous cells were used, great expense would be incurred in the nitric acid or similar agent, unless the single cell battery, which I believe Professor Callard invented some time ago, could be used advantageously, of which I have had no opportunity of judging practically, but I would suggest experiments in that direction.

Apologising for again encroaching on your space,
I am, &c.,

JOHN S. BLOCKEY.

Proceedings of Institutions.

LONDON MECHANICS' INSTITUTION.—In consequence of the recent death of one of the trustees, the Institution is threatened with proceedings in Chancery, to enforce the sale of the property (involving the destruction of the Institution), for the purpose of liquidating the mortgage debt of £1,500, which was recently incurred for the purchase of the premises. The efforts of the friends of the Institution and of education are earnestly solicited by the Committee in order to raise the sum, and thus relieve the trustees from all liability and place the Institution upon a safer basis. Donations will be received by the bankers, Messrs. Smith, Payne and Smiths; Messrs. Hanbury and Lloyd; Messrs. Ransom and Co.; at the Birkbeck Bank for Deposits; and at the London Mechanics' Institution.

MEETINGS FOR THE ENSUING WEEK.

TUES. ...Ethnological, 8. 1. Professor Huxley, "On the Human Remains found in the Shell Mounds of the Malay Peninsula." 2. Mr. Mackie, "On some Human Remains from the Valley of the Trent and Weardale." 3. Mr. Bailey, "On the Vedda of Ceylon." 4. Mr. Clarke, "On some Drawings from Sierra Leone." 5. Dr. Knox, "An Inquiry into the Influence of Climate, &c., on Man."

WED. ...Geologists' Assoc., 7.

FRI.Archæological Inst., 4.

SAT.Asiatic, 3.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, June 13th, 1862.]

- Dated 30th May, 1862.*
1636. J. Ives, Bow—Improved machinery for washing and wringing clothes or fabrics.
1630. C. O. Staunton, Poulton-square, Chelsea—Imp. in apparatus for signalling and indicating the position of shots on targets in rifle practice, and for preventing accidents to the markers.
1632. R. C. Steed, Aylesford-street, St. George's-square, Pimlico—Improved apparatus for signalling on railways.
1634. W. Eddington, jun., Chelmsford—Imp. in apparatus for draining and tilling land.
- Dated 31st May, 1862.*
1689. J. H. Holland, Lorrimer-road, Surrey—An imp. in traction engines.
1644. D. A. Lamb, Berwick-upon-Tweed—Imp. in railway buffers or apparatus to relieve concussion on railways.
1652. W. K. Sullivan, Upper Leeson-street, Dublin—Imp. in the preservation of stone, plaster, cement, and other like matters, the invention being likewise applicable to the manufacture of artificial stone, and to the fixation and production of colours on and in the body of stone, plaster, or cement.
- Dated June 2nd, 1862.*
1654. B. Templar, Manchester—Imp. in apparatus for registering and indicating billiards and other games.
1656. J. Elce and W. J. Gradwell, Manchester—Certain imp. in machinery for spinning, doubling, and winding cotton and other fibrous substances.

[From Gazette, June 20th, 1862.]

Dated 22nd March, 1862.

807. M. Henry, 84, Fleet-street—Imp. in kilns, ovens, and furnaces. (A com.)

Dated 11th April, 1862.

1051. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in fire arms. (A com.)

Dated 21st April, 1862.

1151. A. P. Tronchon, 4, South street, Finsbury—Imp. in the construction of houses, palisades, and other similar constructions.

Dated 24th April, 1862.

1205. T. W. Ashby, Stamford—Improved apparatus for obtaining motive power from the wind. (A com.)

Dated 30th April, 1862.

1282. A. H. Fielden, 35, Castle-street, Holborn—Imp. in show jars, lamps, signals, and lighthouses, and other methods of illumination.

Dated 9th May, 1862.

1389. L. D'Aubreville, 60, Boulevard de Strasbourg, Paris—Imp. in metallic cross sleepers for railways. (A com.)

Dated 13th May, 1862.

1434. J. D. Gavillet and J. P. F. Gandon, 26, Rue Leonie, Montmartre, Paris—Imp. in paddle wheels applied either for propelling steam boats, or as prime movers.

1449. M. Henry, 84, Fleet-street—An imp. in, or addition to, gloves. (A com.)

Dated 17th May, 1862.

1497. R. W. Siever, Guilford-street, Russell-square—An imp. in rams for naval warfare.

Dated 22nd May, 1862.

1543. G. Crawford, Beaumont-street, Portland-place—Imp. in musical instruments.

1545. S. Turnbull and F. Turnbull, Holywell Mount, Shoreditch—Imp. in the manufacture of floor cloths and like coverings.

1549. G. Barlow, Birmingham—A new or improved method of laying submarine telegraphic cables. (A com.)

1551. W. Roberts and T. Greenacre, Millwall—Imp. in cocks or valves for steam or other fluids.

Dated 23rd May, 1862.

1554. P. McGregor, Manchester—Certain imp. in machinery for spinning and doubling cotton and other fibrous substances.

1555. R. Blackledge, Accrington, Lancashire—Imp. in the preparation of materials for sizing, dressing, or finishing wares, yarns, textile fabrics, or paper, and also for thickening colours.

1557. W. E. Wiley, Graham-street, Birmingham—Imp. in the manufacture of certain kinds of penholders, which improvements may also be applied to pencil cases and holders for crayons, and other solid writing or marking materials.

1561. E. Maw, Leamington—Imp. in constructing ships, vessels, forts, and batteries.

1563. W. Clark, 53, Chancery-lane—A new manufacture of socks and stockings. (A com.)

Dated 26th May, 1862.

1565. J. Harrison and R. Parkinson, Blackburn—Imp. in the manufacture of rollers for preparing, spinning, doubling, sizing, winding, warping, and weaving.

1567. C. De Bergue, Manchester—Imp. in iron framing applicable to supporting coverings or surfaces intended to resist blows or pressure.

1568. C. Brakell, W. Hoell, and W. Gunther, Oldham—Imp. in steam and other motive engines.

1569. M. Walls and J. Crompton, Bolton—Imp. in railway signals.

1578. W. Brierley and G. F. Smeeton, Halifax—Imp. in apparatus connected with targets.

1572. W. Worby, Ipswich—Imp. in reaping machines.

1574. J. A. C. N. Delpach, Castres, France—Imp. in pumps.

1575. R. M. Letchford, Three Colts-lane, Bethnal-green—An imp. in the manufacture of matches.

1577. J. E. Holmes, South Parade, Chelsea—Imp. in machinery for digging or cultivating land.

1579. J. E. Holmes, South Parade, Chelsea—Imp. in printing machinery. (A com.)

Dated 27th May, 1862.

1581. E. Tuck, 79A, Leadenhall-street—Certain imp. in electrical manipulation, applicable to submarine telegraphs.

1583. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the manufacture of wire ropes or cables. (A com.)

1585. J. Ireland, Manchester—Imp. in forming moulds for card cylinders.

1587. W. Clark, 53, Chancery-lane—Imp. in brakes for railroad carriages. (A com.)

1588. F. Tolhausen, 17, Faubourg Montmartre, Paris—A new or improved method of applying various mineral and organic substances to wire-gauze, metallic and asbestos tissues, for rendering said tissues available for ornamental and useful purposes. (A com.)

1589. G. H. Sanborn, 100, Fleet street—Imp. in revolving breech-loading fire-arms. (A com.)

1590. J. Hay, Troon, Ayr, N.B.—Imp. in war ships, also applicable in part to floating and land batteries or forts, and in part to mercantile and other vessels.

1591. J. Duffus, Cullen, Banff, N.B.—Improved apparatus for measuring piece goods or webs.

1593. D. T. Moss, 16, Camden-terrace, Leeds—Imp. in fastening horse shoes.

Dated 28th May, 1862.

1597. J. H. Kidd, Manchester—An improved manufacture of compositions applicable for waterproofing fabrics, for coating and protecting various articles, and for various other purposes.
1599. J. Rogerson, Newcastle-upon-Tyne—An iron floating dock to be used for the purpose of building and repairing ships, steamers, barges, and floating vessels of all descriptions.
1601. J. F. Harrison, Cambridge-square, Hyde-park—Imp. in preserving the bottoms of ships from the attacks of barnacles and other incrustations.
1603. T. Turner, Redditch, Worcestershire—Imp. in machinery for scouring and polishing knitting and other pins and needles.
1605. J. Hirst, jun., Dobcross, Saddleworth, and E. O. Taylor, Marsden, near Huddersfield—Imp. in means or apparatus for evaporating water and other fluids, and in economising the use of steam.
1607. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of timed lead pipes, and in the apparatus employed therein. (A com.)
1609. W. Blackmore, Foynes, and H. Lamb, Ennis, Ireland—Imp. in burning limestone, and generating steam.
1609. J. A. Ransome, Ipswich—Imp. in the manufacture of and in fastening railway chairs with wood trenails.

Dated 30th May, 1862.

1628. I. Leon, 4, South-street, Finsbury—An improved curb or rein for enabling riders or drivers to stop restive or runaway horses.

Dated 31st May, 1862.

1640. W. T. Smallwood, Narrow-street, Limehouse, and W. Wright, Dean's-buildings, West India Dock-road—Imp. in water-closets.
1642. T. V. de Veye, 15, Passage des Petites Ecuries, Paris—A coating intended to protect iron from rust, and to preserve wood, cloth, paper, and pasteboard used for packing or roofing.
1650. L. Chaubart, Moissac, France—An improved mode of, and apparatus for, raising the level of water in rivers, canals, and other watercourses.

Dated 2nd June, 1862.

1660. J. Baker, Coatbridge, N.B.—Imp. in pumps.
1662. C. E. Gray, 75, Great Suffolk-street, Southwark—Imp. in apparatus for extracting, rendering, receiving, purifying, cooling down, and delivering oleaginous and fatty matters or other material treated by steam pressure for extraction.
1664. W. E. Newton, 66, Chancery-lane—An improved mode of making the handles of shovels, spades, dung forks, and other analogous articles. (A com.)
1666. A. V. Newton, 66, Chancery-lane—Improved machinery for breaking and cleaning flax and other like fibre-yielding plants. (A com.)
1668. J. J. H. Gebhardt, Lawrence-lane—An improved fastening for bags, purses, and other similar articles. (A com.)

Dated 3rd June, 1862.

1670. G. Gurney, Bude, Cornwall—Imp. in apparatus for production and application of artificial light.
1674. S. Weston, Tenterden, Kent—Imp. in trusses.

Dated 4th June, 1862.

1678. G. Peel, jun., and J. Simpson, Manchester—Imp. in the construction, arrangement, and mode of working hydraulic presses, and in the arrangement of force pumps.
1680. W. James, Red-hill House, Dudley, Worcestershire—Imp. in bolts, spikes, and nails, and in apparatus for their manufacture.
1682. R. Roe, Friargate, York—Imp. in planes for tonguing, working sash fillisters, or other similar purposes.
1684. G. B. Toselli, 41, Threadneedle-street—Imp. in apparatus for freezing and cooling liquids and mixing syrups.
1686. G. H. Sanborn, 299, Fulham-road, Brompton—Imp. in refrigerators. (A com.)
1688. E. Schütz, Brompton—Imp. in rotary engines.
1690. A. V. Newton, 65, Chancery-lane—Imp. in the construction of grain and grass harvesters. (A com.)

Dated 5th June, 1862.

1692. G. Rydill, 6, Wardrobe-place—An improved hydraulic pump or engine for raising liquids and obtaining motive power, also applicable to the ventilation of mines and other useful purposes.
1694. J. Bell, Fortobello, Midlothian—Imp. in fastenings for railway chairs.
1696. J. M. Stanley and J. Stanley, Sheffield—Imp. in stoves or apparatus for diffusing heat.
1700. W. Rowe, East India-road, Poplar—An improved forge and bellows.

1702. G. Hadfield, Bootle Village, near Liverpool—Imp. in the manufacture of casks or barrels, and in the machinery or apparatus to be used in the construction of the same.

Dated 6th June, 1862.

1704. J. Verity, 1, Carlton-road, Kentish-town—An improved composition for coating and preserving walls or other exposed surfaces.
1706. G. Darlington, Much Park-street, Coventry—Imp. in the manufacture of ribbons.
1708. A. V. Newton, 66, Chancery-lane—Imp. in knitting machinery. (A com.)

Dated 9th June, 1862.

1714. J. Lovegrove, Dalston-lane, Hackney—Imp. in apparatus for inspecting small sewers and drains, and for facilitating the removal of obstructions therein.
1716. A. Ford, Priory, Battersea—An improved method of protecting beer and other fluids from the direct action of atmospheric air.
1718. J. Keeling, Reading, Berkshire—Imp. in apparatus for the manufacture of gas.
1720. C. W. Heckethorn, Saint Ann's-road, Brixton—Improved apparatus for obtaining and applying motive power.

Dated 10th June, 1862.

1724. W. Smith, 19, Salisbury-street, Adelphi—Imp. in photography. (A com.)
1726. J. Kinlock, and T. Edmeston, Preston—Imp. in looms for weaving.
1730. H. C. Jennings, Great Tower-street—Imp. in the preparation of skins for driving bands and harness traces.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1795. G. Haseltine, 100, Fleet-street—Imp. in roofs for railroad cars and hurricane decks of vessels. (A com.)

PATENTS SEALED.

[From Gazette, June 20th, 1862.]

- | | | |
|--|---|---|
| <i>June 20th.</i> | 3205. T. Morris, R. Weare, and E. H. C. Monckton. | 3251. M. Henry. |
| 3215. L. R. Bodmer. | 3216. C. Smith. | 3268. J. Haslam. |
| 3217. J. Rosindell. | 3218. C. Smith. | 39. A. V. Newton. |
| 3229. J. Jones. | 3230. T. Standing. | 129. R. Romaine. |
| 3234. J. Shepherd. | 3239. T. Silver. | 140. W. S. Mappin. |
| 3241. P. A. Le Comte de Fontaine-Moreau. | | 163. L. Martin. |
| | | 163. J. Cornforth and B. Smith. |
| | | 403. T. Renison. |
| | | 755. J. A. Jaques, J. A. Fanshawe, and F. Jaques. |
| | | 1173. G. Scoville. |

[From Gazette June 24th, 1862.]

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|--------------------------------------|----------------------------------|---------------------------------|
| <i>June 24th.</i> | 3228. T. Simmons and T. Timmins. | 55. J. Stenhouse. |
| 3235. R. Needham. | 3237. J. N. Palmer. | 68. B. Thompson. |
| 3240. W. Turner & J. W. Gibson. | 3243. T. W. Atlee. | 77. W. H. Preece. |
| 3246. R. A. Brooman. | 3255. J. Gordon & B. Henderson. | 118. J. A. Knight. |
| 3267. W. Spence. | 3274. E. T. Hughes. | 144. W. Boaler. |
| 53. C. Pilkington and T. Pilkington. | | 150. J. Stenhouse. |
| | | 388. W. D. Allen. |
| | | 719. J. Grant. |
| | | 929. G. Collier and J. Collier. |
| | | 1040. J. T. Grice. |
| | | 1304. A. V. Newton. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, June 24th, 1862.]

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|-------------------|-------------------|-------------------|
| <i>June 17th.</i> | 1494. L. D. Owen. | <i>June 21st.</i> |
| <i>June 20th.</i> | 1492. J. Meikle. | 1567. B. Standen. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, June 24th, 1862.]

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|-------------------|----------------------|----------------------|
| <i>June 16th.</i> | 1442. F. W. Mowbray. | <i>June 21st.</i> |
| <i>June 20th.</i> | 1431. W. Teall. | 1418. J. L. Jullion. |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4486	June 5	A Flooring Cramp	Richard Madeley	Birmingham.
4487	" 10	Reversible Target	James Ashburner	{ Lieut. 1st Cheshire Engineer Vo-
4488	" 14	{ Perpetual Calendar for Articles of	Allen and Felton	Birmingham.
4489	" 18	{ Jewellery	Richard Kemsley Day	47, Aldermanbury, E.C.
4490	" 20	Tournure or Crinoline	Farrow and Jackson	18, Great Tower-street, E.C.
		A Screw Bottle Stopper		

Journal of the Society of Arts.

FRIDAY, JUNE 27, 1862.

COUNCIL.

WEDNESDAY, JULY 2ND, 1862.

At the First Meeting of the present Council since their election, Sir Thomas Phillips, F.G.S., Vice-President, was unanimously elected Chairman for the current year.

The following Institution has been taken into Union since the last announcement :—

Bristol Trade and Mining School.

CONVERSAZIONI.

The next Conversazione of the present season will be held on Wednesday next, the 9th July, at the South Kensington Museum. Cards of invitation have been issued.

Mr. G. W. Martin, with a choir consisting of members of the National Choral Society, will give some musical performances during the evening.

The third Conversazione will take place on the 8th October.

INTERNATIONAL EXHIBITION OF 1862.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate of £452,100, have been attached to the Deed.

DECLARATION OF THE PRIZES TO EXHIBITORS.

1. The declaration of the awards of the Juries at a State Ceremony, on Friday, 11th July, 1862, at 1 o'clock, will be made by an International Representative Body of Royal and distinguished personages, specially named by the various nations which have taken part in the Exhibition.

2. The Queen has named His Royal Highness the Duke of Cambridge, K.G., as Her Majesty's representative to receive and distribute the awards to the Exhibitors of the United Kingdom and its Colonies and Dependencies. The Special Representatives of foreign countries will receive and distribute the awards to Foreign Exhibitors.

3. The various ceremonies will take place in the Exhibition Building and in the Horticultural

Gardens, which will be treated as a whole for that day.

4. The Special Representatives will be received by Her Majesty's Commissioners on the upper terrace of the Horticultural Gardens, if the weather be favourable; if unfavourable, in the Conservatory; and the International Juries will then deliver their awards to the Special Representatives.

5. The Special Representatives, after receiving the awards, will pass in procession along the Arcades to the Exhibition Buildings, and at various stations will deliver the awards to the Chairmen of the British Class Committees, to the Colonial Commissioners, and to the Foreign Commissioners, in or near those parts of the buildings where the principal objects of each class or country are placed.

6. Upon the arrival of the Special Representatives at the different stations for distributing the awards, the national airs of the respective nations will be played by military bands, British and Foreign. After the distribution, &c., the procession will assemble again on the Upper Terrace, when "God Save the Queen" will be performed by all the military bands.

7. The public will be admitted between the hours of 10 and 12.30 by season tickets or by special tickets, to be purchased before the 8th July, at 5s. each. On and after that day the price will be 7s. 6d. each. These tickets may be had at the Society of Arts.

8. Exhibitors who may not have season tickets may obtain a free ticket of admission upon personal application to Mr. Thompson, on the British side, and Mr. Owen, on the Foreign side, on or before the 8th July.

ELEVENTH ANNUAL CONFERENCE.

The Eleventh Annual Conference of the Representatives of the Institutions in Union, and the Local Educational Boards, with the Council of the Society, was held at the Society's House on Monday, the 23rd inst., at 12 o'clock noon. Sir Thomas Phillips, F.G.S., Chairman of the Council, presided.

The following is a list of the Institutions and Local Educational Boards represented at the Conference, with the names of their respective representatives :—

Banbury Mechanics' Institution and Local Board	{ Mr. R. Heygate Brooks, Hon. Sec.
Barnet Institute	{ Mr. C. T. Carter, President.
„ Local Board ..	{ Mr. Stephen Baldock, Vice. Pres.
„	{ Rev. C. F. Cass, M.A., Chairman.
Basingstoke, Mechanics' Institute and Local Board	{ Mr. W. W. Beach, M.P.
	{ Mr. Wyndham S. Portal.

year and the three years immediately preceding it, the greatest number of such certificates; the prize not to be taken more than once by the same candidate, and to be accompanied by a certificate from the Society of Arts, setting forth the special character of the prize, and the various certificates for which it was granted.

In addition to the usual prizes offered by the Society, of £5 and £3 to the first and second successful candidates in each subject, extra prizes have been offered by private individuals, friends of education, taking a deep interest in this branch of the Society's operations. In Practical Mechanics, the Rev. J. M. Prower offered a third prize of £2, and three prizes of books, value £1 each; in Animal Physiology (in relation to Health)—Mr. Harry Chester, a third prize of £2, and three prizes of books, value £1 each; in Botany—Dr. Lindley, F.R.S., a third prize of £2, and three prizes of books, value £1 each; in Agriculture—Mr. J. C. Morton, a third prize of £2, and three prizes of books, value £1 each; in Mining and Metallurgy—Sir Thomas Phillips, F.G.S., a third prize of £2, and three prizes of books, value £1 each; in Political and Social Economy—the Dean of Hereford, a third prize of £2 2s., and three prizes of books, value £1 1s. each; in Domestic Economy—the Dean of Hereford, a third prize of £2 2s., and one prize of books, value £1 1s.; in English History—Sir Wentworth Dilke, a third prize of £2, and three prizes of books, value £1 each; and in English Literature, a third prize of £2, and three prizes of books, value £1 each.

The Prince Consort's Prize has been adjudged to J. G. Greenhough, of the Bradford Mechanics' Institution, a merchant's clerk, aged 19, who gained the following certificates:—

1859.—Arithmetic (1st); Algebra (3rd).

1860.—English History (1st); Geography (1st).

1861.—English Literature (1st); Algebra (2nd); Geometry (2nd); Trigonometry (3rd).

1862.—Algebra (1st); Trigonometry (2nd); Geometry (1st) with First Prize.

A statement of the general prizes gained by candidates has already appeared in the Society's *Journal* of the 20th June. The amount taken in prizes by candidates in all amounts to £180 5s. Her Majesty the Queen has been graciously pleased to intimate that she will continue the prize of 25 guineas annually which was founded by his Royal Highness the Prince Consort.

There have been this year some fluctuations in the distribution of the papers among the different subjects of examination, as compared with last.

The following table shows the numbers of papers worked in the different subjects in the two last years:—

	1861.	1862.
Arithmetic.....	336	336
Book-keeping	134	169
Algebra	114	96
Geometry	17	26

	1861.	1862.
Mensuration	43	44
Trigonometry	8	11
Conic Sections	4	2
Navigation and Nautical Astronomy...	3	1
Principles of Mechanics	12	16
Practical Mechanics	12	15
Magnetism, Electricity, and Heat	18	8
Astronomy	4	5
Chemistry	36	37
Animal Physiology(in relation to health)	5	40
Botany	5	9
Agriculture	1	1
Mining and Metallurgy	7	17
Political and Social Economy.....	3	
Domestic Economy	4	8
Geography	44	69
English History	46	80
English Literature	37	21
Logic and Mental Science	5	18
Latin and Roman History	22	20
French	79	80
German	5	17
Free-hand Drawing	40	28
Mechanical Drawing	5	14
Theory of Music	30	23

It is gratifying to record that in some of the subjects to which I called attention in my last report, as attracting but few candidates, there has this year been an increase. I particularly allude to Animal Physiology in relation to health, Practical Mechanics, and Botany.

In the subject of Practical Mechanics, three first-class certificates have been awarded, and this is the first time since the examinations have been established that first-class certificates have been awarded in this subject.

With regard to the general character of the examinations I must refer to the remarks of the Examiners, to be found in the Appendix to the Report. I may be permitted, however, to call attention to a point which does not appear in these reports. In some instances, the Examiners have felt a hesitation in passing the papers of some of the candidates, on account of errors in spelling, though in other respects the papers were of a meritorious character. The Examiners, however, after careful consideration, have thought it right not to reject these papers; but the candidates should remember that, notwithstanding the Local Boards may have passed them in the preliminary examination, they are liable at the final examination to forfeit all claim to a certificate if their papers are ill-spelt. It is also extremely important that the Local Boards, in the preliminary examination, should be careful not to pass candidates too readily in this respect.

The occupations of the various candidates will be found in the table below:—

OCCUPATIONS, OR INTENDED OCCUPATIONS, OF THE 913 CANDIDATES WHOSE RETURN PAPERS WERE RECEIVED.

Accountants and Clerks	8	Art Pupil-Teachers	2
Agent	1	„ Student...	1
Apprentice to Linen		Assistant in Shoe Manu-	
Manufacturer	1	factory	1
Architects	2	Attendant on Machinery	1
„ Clerk	1	Bakers	3

Bookbinder 1	Engine-keeper 1	Reporters 2	Tin-plate-workers ... 2
„ keepers... .. 15	Engravers „ 2	Rug-finisher... .. 1	Tobacco-manufacturer 1
„ sellers... .. 2	„ to Calico Printers... 1	Saddlers 2	Tobacconist 1
„ Assistant 1	Excise Officer... .. 1	„ Ironmonger 1	„ Assistant 1
Boot-closer 1	Factory Operatives ... 2	Sailmaker 1	„ Operative... .. 1
„ makers 2	Farmer 1	Salesmen 7	Turner 1
„ manufacturer ... 1	File Cutters 2	Sawyer 1	„ and fitter 1
„ and Shoe Maker ... 1	„ Manager 1	Schoolmasters 7	Tutor 1
Brass-finishers 2	Fitters 1	Schoolmistress 1	Underground Overseer 1
„ founders 2	Foreign Correspondent.. 1	Scripture-reader 1	Upholsterer 1
„ turner 1	Furnace-man... .. 1	Sempstress 1	Usher 1
Bricklayers 2	Gardeners 6	Shipwrights & Appren- 21	Valuer's Assistant ... 1
Brushmaker 1	Gig-saddle Maker ... 1	tices 21	Viewer in Iron inspec- 1
Builders 2	Glass-cutter 1	Ship Draughtsman ... 1	tionDepartment,Tower 1
„ Clerk 1	„ packer... .. 1	Shopmen 2	Warehousemen 49
Butcher... .. 1	„ painter 1	Spademake... .. 1	Warehouse, Worker in 1
Cabinet-makers 2	Glover 1	Stationers 2	Warpers 2
Calenderer 1	Grainer... .. 1	„ Assistant 1	Watch finisher 1
Carding Engine Tender 1	Grinder... .. 1	„ Clerk 1	„ makers 2
Card Writer... .. 1	Grocers and Assistants 17	Stamper 1	„ manufacturer ... 1
Carpenter 1	Harness-makers 2	Stonedresser... .. 1	Weavers 13
„ and Joiners... .. 2	House-keeper 1	Storekeeper 1	Weigh Agent 1
Carpet Weavers 2	Hosiery 3	„ Assistant 1	Wheelwright 1
Carver and Gilder ... 1	Inland Revenue Officer 6	Students 7	Whip-maker 1
Carrier's Agent 1	Ironmongers... .. 4	„ Normal 2	Wine-merchant 1
Cashiers 4	„ Assistant 1	Surveyors 3	Wood-carver 1
Caulker 1	Ironfounder 1	Table-blade-forger ... 1	Woollen-merchants' Ap- 1
Chemists and Assistants 7	„ moulder 1	Tailors 3	prentice 1
„ Druggists 4	„ turners... .. 2	Tailors and Drapers ... 2	Woolsorters 8
Chemistry, Student of 1	Jacquard Power Loom 1	Teachers 32	„ Stapler 1
Civil Engineers 8	tenter... .. 1	„ at Deaf and 1	Wrights 2
„ and Mining do. ... 2	Jewellers 2	Dumb Inst. 1	Writer 1
„ Service 4	„ shopman 1	Tea-dealer 1	Undetermined or not 26
Clerks, Commercial, &c. 235	Joiners 8	„ Assistant... .. 1	given 26
„ Customs' 2	Laboratory Workman... 1	Teller 1	Total 913
„ Government 3	Letter-carriers 2	Tenter 1	
„ Law, &c. 31	Linen Agent... .. 1		
„ Post Office 2	Lithographic Printer ... 1		
„ in Probate Court 1	Machine-maker 1		
„ Railway 15	Manufacturers 2		
„ in Record Office 1	Mason 1		
„ Telegraph 2	„ (Marble) 1		
Cloth-dressers 2	Master of Workhouse .. 1		
„ finisher 1	Measurers 3		
„ looker 1	Mechanics 9		
Coachmakers 2	Mechanical Draughtsmen 3		
Collectors 2	Messenger 1		
Colliery Agent 1	Meter Inspector 1		
„ Clerks 2	Miller 1		
„ Salesmen 3	Millwrights 2		
„ studying man- 1	Minder 1		
agement of	Miners (Coal and other) 6		
Colourist 1	Mining Engineers 2		
Colour-maker 1	Missionary 1		
Commercial Traveller 1	Model-makers 2		
Commission Agent ... 1	Overlooker 1		
Compositor 1	Organist 1		
Computer at Royal Ob- 1	Packer 1		
servatory, Greenwich 1	Painters 2		
Confectioner... .. 1	Paper Ruler... .. 1		
Core-maker... .. 1	Pattern-card-maker ... 1		
Cotton-spinner 1	„ designer 1		
Curator and Chemical 1	„ drawer 1		
Assistant 1	Pawnbrokers & Assistants 3		
Carriers... .. 3	Perfumer 1		
Customs' Officer 1	Pianoforte-makers 2		
Cutlers 3	„ tuner 1		
Dispensers 2	Picture-restorer 1		
Drapers and Assistants 7	Piecelooker 1		
Draughtsmen 5	Police Constables 2		
Dress-maker... .. 1	Police Sergeant 1		
Druggists 4	Presser and Stamper ... 1		
Dyers 4	Printers 4		
Electro-plater 1	Printseller 1		
Engineers & Apprentices 20	Pupil Teachers 49		
Engine-fitters 9	Railway Agents 2		

There is a small increase in the number of women examined. Eighteen have received certificates, and one of them has obtained the first prize in English Literature.

The new list of Lecturers, prepared in accordance with the wish expressed at the last Conference, has been printed, and is now ready for issue.

A list of subjects suitable for Discussion Classes has been drawn up, in compliance with the request of the last Conference. Copies are now ready for distribution, and the list will be printed in an early number of the *Journal*.

The subject of the formation of the Central Committee of Educational Unions was discussed at the last Conference, and it was agreed that the Committee should consist of two representatives of each Provincial and District Union and Adult Educational Society, four members of the Council of the Society of Arts, the Chairman of the Society's Central Board of Examiners, and six representatives of Local Educational Boards.

The scheme of elementary examinations established by this Committee was shortly afterwards published, and was annexed to the appendix to the Society's Programme of Examinations. The first elementary examinations were held on the 11th, 12th, 13th, and 14th of March, of the present year, the papers having been prepared under the supervision of the Committee, and sent from here to the various places of examination. The Junior Candidates were required to satisfy the Examiners in the first four rules of Arithmetic,

simple and compound; Male Candidates being also examined in two, and Females in one, of the three following subjects:—

A. A General Knowledge of the Gospel History.

B. The Rudiments of English History.

C. The Rudiments of the Geography of England.

Female Candidates were also examined in plain needlework; and fair writing and spelling, with good reading of a simple narrative, were required of every Candidate.

Senior Candidates were examined in Arithmetic, including the Rule of Three, Decimal and Vulgar Fractions; and every Male Candidate was examined in the Geography of the British Isles, and English History from the death of Anne to the accession of Victoria, with the Rudiments of the History from the Conquest.

Every Female Candidate was examined in needlework.

The option of being also examined in the facts of St. Matthew's Gospel and of the Acts of the Apostles was given to the Candidates.

The Candidates were required to exhibit in their papers a fairly good hand-writing, spelling, and knowledge of grammar.

The system having been so recently established, a large number of Candidates could hardly be expected on the first occasion; only five Unions and Local Boards availed themselves of the papers of the Central Committee, namely: Aldershot, Hertford, the Leeds Young Men's Christian Association, the West Riding Educational Board (Leeds), and the Southern Counties Adult Education Society. At the two last, however, the examinations were held at 6 and 35 local centres respectively. 307 Junior Candidates were examined, of whom 157 obtained certificates. The number of Senior Candidates who came up for examination was 118, of whom 70 obtained certificates. The proportion of Female Candidates was small. Of those who obtained certificates there were only 15 among the Junior and 9 among the Senior Candidates. The general results of the examinations are given in the following tables:—

JUNIOR CANDIDATES.

	No. of Candidates Examined.	No. of Candidates Passed.	Arithmetic.	Gospel History.	English History.	Geography.	Plain Needlework.
Aldershot	2	2	2	1	2	2	...
Hertford	5	5	5	5	...	5	...
Leeds Young Men's Christian Association ...	32	15	15	15	8	15	...
West Riding Educational Board (Leeds), 6 centres.	69	50	50	15	38	44	9
Southern Counties Adult Education Society, 35 centres	199	85	85	84	37	76	6
TOTALS	307	157	157	120	85	142	15

The names of the successful candidates will shortly be published in the Society's *Journal*.

A paragraph was inserted in the examination scheme, to the effect that in any case in which a local examining body might examine candidates in the doctrines of Holy Scripture, in the Prayer Book, or in any other Religious Formulary, the results of such examinations might be stated, by that local examining body, on the certificate; though the Central Committee, representing a variety of opinions, does not itself provide for examinations in religious doctrine. Only one union has availed itself of this permission—three senior candidates of the Southern Counties Adult Education Society having been examined in the Church Catechism.

I have the honour to be,

Gentlemen,

Your obedient servant,

P. LE NEVE FOSTER, *Secretary*.

APPENDIX.

EXAMINERS' REMARKS.

The Examiner in Arithmetic says:—"There is this year a marked improvement in the neatness of the work done, and also in the application of the principles by which correct solutions are to be obtained. Some of the papers to which I have awarded first-class certificates are amongst the best I have ever had submitted to me in any competitive examination."

The Examiner in Book-keeping by Double-Entry says:—"The papers of the candidates in this subject are the largest in number, and best in quality, of any yet submitted to me; the total number is 169, against 134 in 1861, and 103 in 1860. A considerable proportion of the whole number are of a high degree of excellence, and the average knowledge evinced greatly exceeds that exhibited on any former occasion.

The Examiner in Algebra says:—"As might have been anticipated, the answering of the candidates in the Algebra Examination has been very various in point of merit. Some few have presented themselves with scarcely any knowledge of the subject in which they were to be examined; others have given evidence of a capability of grappling with an examination of much greater difficulty than that to which they have been subjected. Of 96 candidates, 10 have gained a first class certificate, of whom

SENIOR CANDIDATES.

	No. of Candidates Examined.	No. of Candidates Passed.	Arithmetic.	Geography and English History.	St. Matthew and Acts.	Needlework.
Hertford	1	1	1	1	1	...
Leeds Young Men's Christian Association ...	11	8	8	8	7	...
West Riding Educational Board (Leeds), 6 centres.	48	28	28	27	16	4
Southern Counties Adult Education Society, 35 centres	58	33	33	29	26	5
TOTALS	118	70	70	65	50	9

several deserve very favourable mention for their answers, and merit every encouragement. 26 have entitled themselves to a second class certificate, and 31 to a certificate of the third class. 29 have failed."

The Examiner in Geometry says:—"The number of candidates is still smaller than it ought to be. The papers of the candidates are, I think, of a higher character. Those who have not passed must, I think, have been admitted through mistake. All those who have passed, have done themselves credit, the work generally being accurate, even when its extent is limited."

The Examiner in Mensuration says:—"I find nothing in this Examination which calls for any particular remark. I may mention as an elementary defect, and one which I have always observed, that many of the candidates fail in converting the duodecimal parts of a foot into inches. As a whole the candidates have answered the simpler questions very fairly, but only a few of them have been successful with the most difficult ones."

The Examiner in Trigonometry says:—"The quantity of work done this year appears to me to be less than that of last year, but the quality is good, although no candidate obtained the number of marks entitling him to a first-class certificate. Two questions only of the paper were left undone by some one or other of the Candidates."

The Examiner in Conic Sections says:—"I am sorry that the number of candidates who have answered questions in Conic Sections is so small, and I hope the year is exceptional. I am of opinion, however, that the subject should be continued for the sake of the few who study it; their labours, although they may not be rewarded with the highest honours, deserve encouragement, for they indicate an amount of study of an abstract and exact science which is educationally of great value."

The Examiner in Navigation and Nautical Astronomy says:—"I have only to repeat my annual expression of regret at the absence of any evidence of active interest in these important branches of practical science. Persons engaged in teaching Navigation—and they are easily counted—experience considerable difficulty in finding qualified persons for assistants. The ordinary teaching of Navigation is a mere cramming of certain practical rules for the purpose of passing an examination—a most unhealthy practice, indicative of a sense of helplessness, arising from lack of application and interest in the most important of their professional duties, on the part of young seafaring men. I am glad to learn that the merchants of London are about to establish a school-ship in the Thames, for the better training of the young officers of the merchant marine."

The Examiner in the Principles of Mechanics says:—"Of the sixteen students whose papers have been forwarded, I have the pleasure of stating that four have given me very considerable satisfaction, by the intelligence which they have displayed in answering the questions proposed. The principal defect which I have noticed—and which, indeed, is common to all the papers—is a want of clearness and method in the description of what they evidently know. I am compelled to refuse a classification to eight out of the sixteen, a step which, I think, will be justified by even a casual glance at the papers of those rejected. But, nevertheless, on the whole, the results of this examination show a marked and cheering advance, the successful candidates having surpassed, I think, those of former years."

The Examiner in Practical Mechanics says:—"In this subject fifteen candidates have presented themselves for examination, and it will be seen that three certificates of the first class and five of the second class have been awarded. This result is encouraging, and contrasts favourably with that exhibited in any previous year."

The Examiner in Electricity, Magnetism, and Heat, "regrets that on the present occasion the average standard

of excellence has hardly come up to that of past years. He would particularly direct the attention of students to the more important practical bearings of the subjects—*e.g.*, the Mariner's Compass, Terrestrial Magnetism, the Electric Telegraph, the Properties of Steam; a very limited acquaintance with some of which is generally manifested."

The Examiner in Astronomy says:—"The papers this year are very different from those of the preceding year, which were distinguished by light reading generally. They are entirely free from Astronomical literature, and all of them more or less show that considerable attention has been paid to the form of lenses, and to the fundamental law on which luminous rays depart from their primitive direction, in passing from one transparent medium into another. Considerable knowledge was also shown, in some of the papers, as to their combination in different descriptions of telescopes. The law of atmospheric refraction had received some attention, but with the exception of two candidates, its practical application was not understood. Increased attention has also been paid to the construction of instruments, and to the better understanding of their use, and to the reduction of observations. Upon the whole, these papers are the most practical and the best I have had. I would advise future candidates to pay additional attention to optics, geometry, trigonometry, and practical work generally."

The Examiner in Chemistry says:—"The papers in this subject are, on the whole, decidedly better this year than on most previous occasions."

The Examiner in Animal Physiology says:—"In the present examination, with a great increase in the number of candidates over last year, I am sorry to say that the papers do not show a proportionate advance in merit. No candidate passes with a first-class certificate; 9 only obtain a second-class certificate; 13 a third-class one; and 18 fail to obtain even that. It is needless to say that no paper approaches the highest of those written last year. In the better papers of this year the great defect is incompleteness of exposition, and not positive or serious inaccuracy. In the medium papers both these defects sadly prevail. In the lowest papers there is a serious looseness of statement, and often a want of aim in the replies."

The Examiner in Botany says:—"Although there is an improvement in the answers of the students who have this year come up for examination, still I am obliged once more to remark that practical Botany is not so familiar to them as it ought to be. This is sufficiently shown by the curious fact that not one examined could state the difference between *Triticum* (wheat) and *Hordeum* (barley). So again in naming plants, although four extremely common species were submitted to the students, all in the best possible state, one did not pretend to name them at all, one named them all wrong, two could name only half, and only one student could name them all. In like manner in describing plants according to rules laid down, and in correct technical language, out of eighteen answers four only were passable, and they were bad, all the rest being entire failures, and yet the power of describing plants correctly is the only foundation of sound botanical knowledge."

The Examiner in Agriculture "again reports of the single paper submitted to him, that a higher place would have been awarded to it but for the defective replies to several questions on details of farm practice, by which alone, of course, real competency or proficiency in agricultural knowledge must be tested."

The Examiner in Mining and Metallurgy says:—"I would make the following observations relative to the Examination Papers of the present year. The questions relative to Mining have generally been answered in such a way as to give evidence of considerable theoretical knowledge as well as practical experience on the part of the students, but the Metallurgical questions have been

in most instances less satisfactorily treated. On the whole, I consider the replies exceedingly creditable."

The Examiner in Political and Social Economy says:—"I regret to observe that the standard of the candidates is decidedly below any thing I have seen before in these examinations."

The Examiner in Domestic Economy says:—"The number offering themselves for examination in this subject is only eight, and although double what it was last year, it is much smaller than might have been expected. The answers are, on the whole, very satisfactory, and much in advance of those given on the last occasion. The smallness of the number offering themselves for examination may be owing to this—that the subject is not one to which much attention is given by the Institutions."

The Examiner in Geography says:—"The impression left on my mind by the inspection of the geographical papers of this year is in all respects favourable. The number of first-class certificates which I am able to award, bears, I think, a higher ratio to the whole than on most former occasions, and the cases of failure are by no means numerous. The total number of candidates is greater than in any previous year. I feel sure that those candidates who gain the distinction of first-class certificates in Geography have earned the right to them by diligent and thoughtful study of their subject, not neglecting its essential and rudimentary details in their anxiety to attain its higher generalisations. This is what it has always seemed to me most desirable to encourage. Geography, too long studied (at least in this country) empirically, and treated as a mere aggregate of isolated facts and data, has now its admitted rank amongst the exact sciences, and, as in the case of other sciences, every geographical fact claims its due place in the great circle of knowledge. A geographical truth has its antecedents and its consequences, like a truth of any other science, but to the appreciation of this, and the attendant claim to real knowledge of geography, a perfect mastery over the elements of the subject is altogether indispensable. A knowledge of numerals is not more essential to the mathematician than is familiarity with such details as are best learnt by the aid of the map (and, indeed, are only to be mastered and fixed in the mind by reiterated exercise upon the map, aided by familiar practice in its construction) to the geographer, in the highest sense of the word. Those only by whom such details have been duly mastered can understand the truths of Physical Geography—still more, appreciate their full value and bearing. I find evidence of labour directed to such an end in the work of this year's candidates, and the success which has been attained by no inconsiderable number of them, may well serve as encouragement for the efforts of future years."

The Examiner in English History reports:—"The papers on this subject this year were of very unequal merit. The best were perhaps equal to the standard of former years, but there was an unusual proportion of worthless papers. This may perhaps be ascribed partly to the fact that Macaulay's History was a text-book. Several students seems to have mistaken their interest in the style of a great author for knowledge of history; and some evidently believed that they might secure a first-class certificate with only a portion of the work. Candidates will do well to remember that a paper which missed the four questions on the first 1500 years of English History, or the three questions on Constitutional History, was disqualified for the first-class, by the mere fact of these omissions. Again, vague or inaccurate knowledge is worse than useless. It is no sufficient answer to say that Magna Charta is the first bulwark of English liberty without specifying any of its principal provisions. Those who intend to offer themselves next year will do well to practise themselves in writing answers without books to old examination papers. Accuracy and thoughtfulness are the two qualities that tell most in all examinations, and both are best perfected by exercise."

The Examiner in English Literature says:—"Though the number of Candidates in this subject is smaller than that of last year, it is peculiarly satisfactory to observe that every one of them has passed, and that a good proportion of them are in the first class. They have generally shown a sound acquaintance with the text of the authors on which they have been examined, and have committed but few mistakes in spelling or grammar. The worst defects in the answers appear to have resulted from a want of attention in mastering the meaning of the questions."

The Examiner in Logic and Mental Science says:—"A decided improvement is to be noticed this year, both in the number of the Candidates in Logic and Mental Science, and in the general quality of the answers. More attention has been given to the practical application of logical rules. Of the text-books in Mental Science, Paley's Moral Philosophy seems to have received the most intelligent attention, whilst the answers upon Bacon's Organon are the most meagre, from the want of collateral knowledge. On the whole, the examination is more satisfactory than in any former year."

The Examiner in Latin and Roman History says:—"In Latin the average is decidedly better this year than last, both in parsing and translating, but no higher excellence has been reached by the best than before. The answers in Roman History do not seem to me quite so good as before; but I cannot say that this is more than an impression."

The Examiner in French says:—"I am glad to be able to report still further improvement in the French papers. Whilst the standard is certainly not lower, the number of certificates granted this year, especially of the first class, is much larger in proportion than it has ever been. Compared with the results of former years, the present Examination has indeed proved very gratifying."

The Examiner in German says:—"The Examination Papers for this year have been nearly all better than in former years; the translations of German into English, and of English into German, showing much progress. It is also gratifying that there was a considerable increase of candidates, proving that the falling off at the last examination was purely accidental; I have even been informed that, in one place at least, the number would have been greater, but that many were kept back by the subject of the Essay—an incident in German History. The plea is that they have not leisure enough to study the history of a foreign country together with its language, and as the primary object of these Essays is to test the powers of composition of the student, we may as well remove this stumbling-block, and give, in future, subjects with which every fairly educated candidate may be presumed to be familiar. I may, nevertheless, add that in most of the Essays I had to look over on the present occasion, a good knowledge of the question was displayed, if the mode of expressing it was not always what might have been desired."

The Examiner in Free-hand Drawing says:—"The drawings which have been made by the candidates this year are very superior to any that have been submitted to me during the last few years. If I remember rightly, no first-class certificate has for some time past been awarded, consequently the prizes offered by the Society have not been given. I am glad to be able this year to award three first-class certificates, so that the prizes will be taken. I consider each of these three candidates a credit to the Institution to which he belongs, and deserving of encouragement, though of course I prefer the drawings by that candidate to whom I have given the greatest number of marks. I think it probable that the remarks which appeared in the *Journal* of the Society last summer, condemning the mode of study followed in some schools—that is to say, "copying from the flat, and not drawing from nature or from the round"—induced many young

TABLE I.—RESULTS OF THE EXAMINATION OF 1862.

NAME OF LOCAL BOARD.	No. of Candidates Examined at previous Exam. by Local Board.	No. of Candidates who passed previous Exam. by Local Board.	No. of Candidates Examined at Final Examination.	No. of Candidates who passed Final Examination.	No. of Papers Worked at Final Examination.	No. of First-class Certificates awarded.	No. of Second-class Certificates awarded.	No. of Third-class Certificates awarded.	No. of Prizes awarded to Candidates.	No. of Unsuccessful Candidates.
Aberdeen	29	19	27	18	43	3	12	10	1	9
Aldershot	7	7	7	3	9	..	2	2	..	4
Asford	4	4	6	6	6	2	2	2	..	..
Bacup	12	12	12	3	27	..	1	4	..	9
Banbury	6	5	6	3	7	2	2	1	..	2
Barret	2	2	4	1	6	1	1	2	..	1
Belfast	1	1	2	1	4	..	1	2	..	1
Birmingham and Midland	5	5	12	11	15	5	4	4	1	1
Bishop's Stortford ... ..	..	..	1	1	1	..	1	..	..	..
Blackburn	20	14	6	1	7	..	2	1	..	5
Blanford ... ..	..	..	1	1	4	..	2	2	..	..
Bradford	20	17	18	15	35	6	13	9	3	3
Brighton	2	2	2	2	6	..	3	3	..	..
Bristol	20	19	19	14	27	3	9	6	..	5
Brompton (near Chatham)	6	6	9	5	15	2	3	2	..	4
Bucks and Berks Adult Education Society	1	1	3	2	7	2	2	2	..	..
Burnley (East Lancashire Union)	12	12	12	9	17	3	8	1	2	3
Bury Athenæum (Lancashire)	3	3	3	2	3	..	..	2	..	1
Bury St. Edmund's	3	3	3	3	7	2	..	2	..	..
Canterbury	1	1	1	1	1	..	1	..	..	..
Carlisle, Church of England Institution	3	3	4	4	4	..	3	1	..	..
Mechanics' Institution	3	3	4	3	7	2	1	1	..	1
Chelmsford	10	9	8	7	8	1	3	3	..	1
Darlington	3	2	3	3	3	..	1	2	..	..
Deftford	15	5	6	5	9	..	4	3	..	1
Derby	5	5	5	4	6	1	3	1	..	1
Devonport	24	22	28	25	72	21	25	15	2	3
Glasgow (Popular Evening Classes, Andersonian University)	45	43	41	32	52	4	17	16	3	9
(Athenæum)	48	45	42	41	55	26	17	10	8	1
(Institution)	32	30	20	25	39	8	16	10	1	4
(Mechanics' Institution)	43	40	27	21	35	5	9	12	2	6
Greenwich	6	6	4	4	9	3	1	5	..	..
Halifax (Mechanics' Inst.)	11	11	10	10	14	7	1	6	..	..
(Working Men's College)	16	14	16	15	19	7	8	3	..	1
Hartlepool (West)	2	2	2	1	3	1	..	..	..	1
Hertford	4	4	6	5	8	3	2	2	1	1
Hitchin	3	3	4	3	4	1	2	..	1	1
Holmforth	4	1	2	1	2	1	..	..	..	1
Leeds (West Riding Union of Institutions)	26	25	23	22	47	7	16	13	..	1
(Young Men's Christian Association)	24	24	21	19	35	8	16	5	1	2
Leicester (Church of England Inst.)	1	1	1	1	1	..	1	..	..	..
Lichfield	13	9	12	10	20	..	9	5	..	2
Liverpool	47	43	55	52	70	25	24	14	4	3
London (City of London College)	17	11	15	15	21	4	9	6	3	..
(Mechanics' Inst.)	10	9	11	8	13	2	4	4	..	3
(Polytechnic Inst.)	9	9	15	12	23	5	3	10	..	3
(St. Stephen's, Westminster)	8	8	9	8	12	..	2	9	..	1
(St. Thomas, Charterhouse) ... ..	..	..	1	1	1	..	1	..	..	..
Lough ... ..	..	..	2	2	3	..	2	..	..	..
Macclesfield	42	29	35	33	51	10	18	16	..	2
Manchester (Mechanics' Inst.)	10	9	10	6	10	1	2	3	..	4
Middlesbrough	7	7	9	8	22	1	8	7	..	1
Newcastle-on-Tyne (Church of England Inst.)	9	7	8	7	14	4	2	5	1	1
(Mechanics' Inst.)	13	9	9	6	17	..	1	8	..	3
Nottingham	7	6	10	7	14	..	5	4	..	3
Oldham	9	9	9	6	11	1	4	3	..	3
Paisley	8	8	9	8	14	3	4	3	..	1
Pembroke Dock	2	2	2	2	6	2	2	2	..	..
Peterborough ... ..	..	2	2	1	3	..	1	..	..	1
Poole (Southern Counties Adult Education Society)	6	6	7	5	13	4	2	3	1	2
Richmond	20	16	13	10	16	3	4	5	..	3
Salford	19	..	1	1	1	1	..	..	..	..
Selby	19	17	27	17	34	4	6	13	..	10
Sheffield	59	35	2	2	6	..	2	2	..	..
Southern Counties Adult Education Society, Southampton	..	..	..	..	..	..	..	..	..	..
South Staffordshire, comprising eight centres, viz :—	..	..	..	..	..	..	..	..	..	..
Bilston ... ..	..	..	..	..	..	..	..	..	..	..
Bsmethwick ... ..	..	..	..	..	..	..	..	..	..	..
Stourbridge ... ..	..	..	..	..	..	..	..	..	..	..
Walsall	64	52	59	51	87	21	23	25	7	8
Wednesbury ... ..	..	..	..	..	..	..	..	..	..	..
West Bromwich ... ..	..	..	..	..	..	..	..	..	..	..
Wolverhampton ... ..	..	..	..	..	..	..	..	..	..	..
Worsley ... ..	..	..	..	..	..	..	..	..	..	..
Thirsk (Yorkshire Union)	4	4	4	4	11	1	5	2	..	..
Wakefield	10	10	11	4	12	..	5	..	..	7
Warminster	1	1	1	..	1	..	..	..	..	1
Waterford	4	3	1	1	1	..	..	1	..	..
Wellingborough	7	4	4	4	4	1	1	2	..	..
Wigan	6	6	8	8	12	6	5	1	1	..
Worcestershire Union	3	3	2	2	2	..	1	1	..	..
York	7	7	8	7	12	..	2	9	..	1
TOTALS	903	773	815	668	1,217	239	372	331	44	147

* Return included in that from Southern Counties Adult Education Society.

TABLE II.—RETURN OF THE NUMBER OF PAPERS WORKED IN THE FOUR LAST YEARS, WITH THE RESULT FOR THE YEAR 1862.

SUBJECTS.	1859.	1860.	1861.	1862.				
				No. of Papers Worked.	No. of First-class Certificates.	No. of Second-class Certificates.	No. of Third-class Certificates.	No. of Papers in respect of which no Certificate was awarded.
Arithmetic	232	263	336	336	45	86	101	104
Book-keeping	84	103	134	169	100	55	14	...
Algebra	82	77	114	96	10	26	31	29
Geometry	} 45 {	27	17	26	3	5	14	4
Mensuration		11	43	44	2	11	15	16
Trigonometry		17	8	11	...	1	4	6
Conic Sections	4	5	4	2	...	1	...	1
Navigation, &c. ... ..	...	2	3	1	...	1	...	...
Statics, Hydrostatics, &c.	17	...	...	...	...	...	...	...
Principles of Mechanics... ..	...	7	12	16	...	4	4	8
Practical Mechanics	7	7	12	15	3	5	1	6
Magnetism, Electricity, &c.	5	11	18	8	1	3	1	3
Astronomy ... ..	...	6	4	5	...	3	2	...
Chemistry	28	28	36	37	6	16	8	7
Animal Physiology	2	5	5	40	...	9	13	18
Botany	2	11	5	9	1	2	4	2
Agriculture ... ..	...	...	1	1	...	1	...	...
Mining and Metallurgy... ..	...	...	7	17	2	8	3	4
Political and Social Economy	14	7	3	6	...	2	1	3
Domestic Economy ... ..	...	...	4	8	1	5	1	1
Geography	28	34	44	69	18	29	13	9
English History	38	43	46	80	14	21	32	13
English Literature	30	39	37	21	5	10	6	...
Logic and Mental Science ... ..	...	12	5	18	6	6	4	2
Latin and Roman History	18	10	22	20	3	11	4	2
French	87	69	79	80	13	22	26	19
German	14	16	5	17	...	1	13	3
Free-hand Drawing ... ..	...	...	40	28	3	6	11	8
Geometrical Drawing ... ..	...	...	5	14	...	4	4	6
Music	12	13	30	23	3	18	1	1
TOTALS	766	821	1,079	1,217	239	372	331	275

men to follow a more useful mode of studying drawing, for not only are the first-class drawings better than usual, but there appears more intelligence amongst the second and third-class men than there was at the examinations in former years. I may be mistaken in this surmise, but, as it is a subject which interests me very much, and might be of use in guiding teachers of drawing schools, I should think it worth while inquiring whether any different mode of study has been adopted at some of the institutions."

The Examiner in Geometrical Drawing says:—"The examination in this subject has been rather better than the last, but till the causes of failure I have formerly mentioned are removed, greater success can hardly be expected. I must again express my regret that the desire to obtain higher marks induces candidates to attempt questions which they must be conscious are beyond their powers, instead of securing the more favourable return which would result from work of a less ambitious character better done. There appears a frequent neglect of the conditions of the question, either from a wrong conception of its meaning, or from a belief that strict compliance with them would not be required. Perspective projection, a subject commonly supposed to be easily learnt, is that in which the most signal failure usually occurs."

The Examiner in the Theory of Music says:—"There is little increase in the number, but much improvement in the quality of the music papers. One only

has not passed, while I have been able to place a considerable number in the second, and some even in the first class. The candidates show generally a better estimate of their own powers—either answering the more difficult questions (in harmony for instance) fairly well, or not attempting them all."

TABLE III.

This Table shows the ages of the 913 Candidates from whom return papers were received. Of these 815 underwent the Final Examination.

Age.	No. of Candidates.	Age.	No. of Candidates.
16 ...	94	30 ...	5
17 ...	122	31 ...	7
18 ...	111	32 ...	2
19 ...	100	33 ...	4
20 ...	92	34 ...	3
21 ...	98	35 ...	3
22 ...	78	36 ...	1
23 ...	58	37 ...	5
24 ...	29	39 ...	4
25 ...	27	40 ...	1
26 ...	19	41 ...	1
27 ...	14	42 ...	1
28 ...	16	43 ...	1
29 ...	16	45 ...	1

The CHAIRMAN introduced the subject of—

THE PROGRAMME OF EXAMINATIONS FOR 1863.

The SECRETARY stated that he was not aware that any alteration was proposed in the programme of the examinations for the ensuing year.

It was agreed that Tuesday, 28th* of April, and three following days be fixed for the Examinations.

CENTRAL COMMITTEE OF EDUCATIONAL UNIONS.

Mr. HARRY CHESTER said so far as this system had been brought into operation it had been very satisfactory. It was desirable that attention should be called to it on the present occasion, in order to get a large number of Institutions to take up the subject and avail themselves of the same scheme. It had been carried out largely by the Southern Counties Adult Education Society, and the Yorkshire Union, and he had no doubt other districts would be desirous to avail themselves of the same advantages.

Mr. BARNETT BLAKE (Yorkshire Union) said he had prepared a resolution with a view of bringing this subject before the Conference.

The Hon. and Rev. SAMUEL BEST (Southern Counties Adult Education Society) said it was very important that this system should embrace as many districts as possible, because every addition that was made enhanced the value of the certificates given. The certificates awarded by the Central Committee had now a uniform value, whether granted by the Southern Counties or any other Union. He hoped Mr. Blake would be able to confirm what he (Mr. Best) could state, viz., that the system had worked very satisfactorily in his district, indeed he might say it had been a complete success. A considerable proportion of the candidates examined had passed, and he was happy to find that of the five candidates which came up for the Final Examinations of the Society of Arts, three had obtained the Society's certificates. He thought year by year they should find an increasing number of those who passed the Examinations of the Central Committee coming up to the Society's Examinations.

Mr. BLAKE said there could be no question that great advantage would arise if these elementary Examinations were made better known. He therefore begged to move the following resolution:—

“That the Institutions in connection with the Society of Arts be recommended by this Conference to adopt the scheme of elementary Examinations prepared by the Central Committee of Educational Unions, and to stimulate the extension of instruction in evening classes by giving every possible publicity to its advantages.”

One of the chief difficulties was to get the thing known, and to fix attention to it. In the Yorkshire Union they published placards announcing these Examinations, and hung them up in the reading-rooms. The town of Leeds, having its twenty or thirty Institutes, might very readily form a district of its own by union with Institutes within a reasonable distance, and it would be a great advantage to do so, but the system had not met with encouragement there. He had been to some of the out-of-the-way places and found candidates. At Redcar, a small village, he found a very creditable Institute established, and four senior and two junior candidates were sent from it; one of them, a female, stood No. 2 in the Examinations. The result was the award of certificates, which were far more valuable than if they had resulted from Examinations by people in their own place. Candidates who came from the small manufacturing village of Bingley also stood well in the Examinations. He had not seen the results of the Society's Final Examinations, published in the last *Journal*, but he knew that there were a great many candidates from the Elementary Examinations who had ob-

tained certificates. He felt satisfied that in another year, with further publicity, there would be a great increase in the numbers of those who would take advantage of these Elementary Examinations, and that the certificates would be a matter of great pride to those who competed for them. In one Institute it was already agreed that they should be uniformly framed and glazed. He had brought forward this resolution with the view of eliciting the opinion of the Conference upon the subject.

Rev. J. B. KENNERLEY (Salford Working Men's College), in seconding the resolution, said he could bear his testimony to the utility of the system of Examinations by the Central Committee of Educational Unions. In the college he represented they had certificates in different forms of lettering, which were given to the successful competitors. One great benefit arising from the system was the improvement of the orthography of the candidates, which was for the most part very defective amongst the adults. The correction of bad spelling was best effected by habitual writing. The eye must be trained as well as the hand, and the eye could not be trained to the orthographic form without the use of the pen. One of the great difficulties met with was the timidity of the pupils in offering themselves for examination, but after having passed an elementary examination, they came with more readiness to the Society's examinations. They all knew the value of confidence in examinations. If a candidate was timid, all his ideas passed away from him for the time. He believed if this system of educational unions were more extensively adopted it would do great good, and would improve the character of the examinations.

Mr. E. AKROYD (Halifax Working Men's College) had much pleasure in supporting the resolution, upon two or three important considerations. Allusion had been made to the greater value of the certificates from the fact that they had general currency. He compared the certificate of the Society of Arts or of the Central Committee to a Bank of England note, which was current all over the country, whilst the local certificates stood in the light of a provincial bank-note, circulating principally in one locality. Before they adopted this plan of certificates, the practice in the Working Men's College, of which he was principal, was to grant certificates which embraced a period of three years, which were given to children who attended evening classes, and who had recommendations of three years' standing, and these certificates were of value to the recipients. He thought the time had now arrived for the Society to re-consider the whole machinery of education. His own experience had shown him that evening classes must be worked in connection with day-schools, and the same educational staff might, he thought, be advantageously extended to evening schools. In his own locality the masters of the day-schools stimulated the day scholars to attend the evening schools. The result was they got day scholars who attended till they were thirteen years of age, and these children afterwards formed the juvenile classes of the Working Men's College, till the age of seventeen. By this means they got rid of *dilettante* teaching, which was the great difficulty of Mechanics' Institutes. Pupils liked to be under a trained schoolmaster; they had more confidence, and attended better to his instruction. The time had gone by when amateur teaching would do for the working classes; and upon the plan he suggested Mechanics' Institutes would cease to be mere elementary schools. He believed the Working Men's College of Halifax fulfilled its purposes in an admirable manner, and that both the working men and the junior scholars who attended, were *bonâ fide* members of the operative class. He attributed that to the fact that the head schoolmaster of the day school was the head-teacher of the College, and by that means a proper degree of influence was exerted from the junior to the senior classes of scholars.

Mr. JAMES PARKER (Marylebone Literary and Scientific Institution) said he was formerly Secretary to an Insti-

* It has since been found necessary to alter this date to the 5th of May and three following days.

tution in the metropolis which did not do its duty, and success did not attend its operations, owing, as he believed, to defects in its management. In the Educational department they had not a sufficiently academic system; it was mere playing at instruction. That was found to be the case in the old Westminster Institution, and they got over the difficulty in some measure by framing short rules for the regulation of the students attending the classes; but the system was not carried out satisfactorily. As regarded the Marylebone Institution, they found that classes in which there had been from thirty to forty students, had come down to three or four, mainly because, as he believed, they thought they were playing at learning. He would press upon the Conference the necessity of having a set of stringent rules for students, which he thought a matter of great importance.

The resolution was then adopted.

LIST OF LECTURERS.

The CHAIRMAN said the next subject on the paper was simply the new List of Lecturers, copies of which had been laid on the table.

Mr. W. O. FIELD (Gosport Literary and Scientific Institution) asked whether the List of Lecturers was to be regarded merely as a directory, or whether the Society recognised any claims upon the attention of Institutions on the part of those gentlemen whose names appeared on the list. He was led to ask this question from having received a communication from a gentleman who designated himself as "lecturer to the Society of Arts." He thought that was calculated to mislead inexperienced secretaries of Institutions, unless such an appointment as lecturer to the Society of Arts existed, which he had never heard of before.

The CHAIRMAN said the answer to Mr. Field's question would be found in the preface to the List of Lecturers, which stated that "It is not to be taken in any sense as a selected or recommended list. The names of Institutions annexed to the lecturers are simply added to facilitate reference and inquiry."

Mr. FIELD thought it his duty to call attention to the communication he had received, and to inquire whether the person alluded to had any authority for using the name of the Society in the manner he had done.

The CHAIRMAN would distinctly state that no person was authorised to adopt such a designation as lecturer to the Society of Arts, inasmuch as no such appointment existed.

Mr. CHESTER said the Council were obliged to Mr. Field for having brought the matter before the Conference. It should always be understood that the List was solely prepared as a directory, and the Society studiously avoided putting forward or recommending any lecturer. He was certainly at a loss to understand how the title of lecturer to the Society of Arts could be claimed.

Mr. R. HEYGATE BROOKS (Banbury Mechanics' Institute), remarked that secretaries and committees of institutions might be misled by such an announcement. For his own part he should be inclined to have confidence in a person using that title.

The next subject for consideration was

WHETHER ARRANGEMENTS CAN BE MADE TO ENABLE EXCURSION PARTIES FROM INSTITUTIONS IN UNION TO VISIT THE INTERNATIONAL EXHIBITION ON SOME DAY OR DAYS TO BE AGREED UPON.

The CHAIRMAN said he should be happy to hear any remarks or suggestions on this subject.

Mr. AKROYD remarked that the principal point to be considered was whether the Council thought they would be able to offer any facilities in the reduction of railway fares. The days of visit must be left to the Institutions themselves.

The CHAIRMAN said the Secretary would tell them what was done last year with respect to the visit to the Crystal Palace.

The SECRETARY said it was quite clear that they in

London could not make arrangements so well as parties in their own neighbourhood. Last year the railway companies expressed themselves willing to run excursion trains from different localities at reduced fares, and several companies did so on the day appointed for the Crystal Palace visit last year.

Mr. BLAKE remarked that, so far as the Northern districts were concerned, arrangements had been nearly completed for a visit to the Exhibition. With the competition between the Midland and Great Northern Railways, there was little to be desired with respect to the reduction of the fares as far as Lancaster.

The SECRETARY said the question was, whether it was desirable to have a gathering of Institutions, and whether a wish to that effect was entertained by the Institutions themselves.

Mr. S. REDGRAVE suggested whether, in the event of any such proposition being affirmed, some members of the Society should meet the visitors and act as guides through the Exhibition.

The CHAIRMAN said the Council would be happy to make arrangements as far as possible to promote the usefulness of the visit.

Mr. CHESTER said the Council had had this subject under their consideration, and they had been considering whether any means could be adopted to make an aggregate visit to the Exhibition instructive, more particularly as regarded members of Institutions in union with the Society. One means would be to suggest to the exhibitors themselves, that it would be to their own interest as well as of advantage to the visitors, that descriptive labels should be affixed to the more important objects exhibited. That was one suggestion. Without some plan of that sort a great number of persons might pass by some of the most interesting objects without any conception of what they were. The Council would also be willing to communicate with the railway companies, requesting them to make arrangements similar to those which they made for the Social Science Congress and the volunteers, so that the visitors could travel to London and back at low fares, and as the interest of the railway companies was the best monitor, no doubt something might be done in that way. Mr. Redgrave had alluded to the important point as to whether on any particular days some of their friends could meet the visitors and endeavour to assist them, by their guidance and explanation, in making the visit useful and entertaining, but the difficulty in that was, that wherever that was done there would be an immense rush of people, and the object they had in view would be frustrated. It would be a great satisfaction to the Council to see this proposition carried out with good effect if any practical means of doing it could be suggested.

Rev. J. B. KENNERLEY said he had been informed that an attempt to organise a visit of one of the Working Men's Colleges had failed, as the individual members preferred going with their own personal friends. He thought all that could be done in the matter on the part of the Society was to communicate with the several railway companies with a view to the obtaining of reduced fares for such parties of visitors, and inducing the exhibitors to place good descriptive labels upon their articles. He believed it would be impossible to keep a dozen people of a party together in such a place as the Exhibition.

Mr. F. TALBOT (Messrs. Chances' Library, Smethwick), believed such an excursion would be a failure. In 1851, Mr. George Wallis kindly undertook to conduct a party from Birmingham through the various courts, but it was impossible to keep the people together, and they soon distributed themselves all over the building.

Mr. BROOKS attached great value to annual gatherings of the members of Institutes. It made them appreciate the union of Institutes, seeing that was one of the practical results of it, and it led to a fraternal intercourse which could not but be beneficial. Whether it was at the Exhibition or elsewhere, he strongly advocated the plan. He regretted that the Banbury Institution was not able to

join the gathering at the Crystal Palace, but it happened on a day when a floral *fete* took place at Banbury.

LORD TALBOT DE MALAHIDE (Dublin Statistical Society) said allusion had been made to the difficulty of keeping a large body of people together in such a place as the Exhibition. For his own part, he could say there was difficulty in keeping even a jury together. He thought a good deal might be done by the labelling of the articles. In the picture-gallery considerable additions were being made to the labels, which could easily be extended to the other portions of the exhibition. He thought great assistance might be given by means of a short guide, calling attention to the most remarkable things in each department.

The CHAIRMAN said there were guides published already at a penny each, and unless they could be sold at a cheap rate, they would not get into the hands of those for whom they desired to make provision. In August a general report of the juries would be published, but that would necessarily be an expensive work, and was only calculated to assist the wealthier classes.

Attention was called by a REPRESENTATIVE to McDermott's Shilling Guide, which he thought afforded information in as concise a form as was practicable.

MR. REDGRAVE remarked that Mr. Foster had drawn up an admirable preface to the Catalogue of the Photographic Department, and if something similar were done by the superintendents of other departments, great assistance would be given in the way of information. It would be difficult for the Society to interfere with private undertakings in the shape of catalogues and guides.

The SECRETARY said as to class catalogues, he did not think that was quite the point before them. The great object would be the getting up of some concise guide, which should enable persons coming up for a short visit to see the most remarkable objects in the Exhibition rapidly. What he had done was merely to write a short preface to the Catalogue of the collection of photographs, pointing out the specimens representing the various processes.

REV. J. B. KENNERLEY thought it desirable to arrange for annual gatherings of Institutions apart from the Exhibition which was a thing only for the present year. He hoped next year, the operatives in the manufacturing districts would not be so badly off as they were now.

MR. F. TALBOT stated the arrangements that had been made for the visit of a party from Birmingham to the Exhibition. They had made a favourable contract with the railway company for a certain number of passengers. It was proposed that some of their number who had previously been over the exhibition should make a large plan of the building to be hung up in the Institution, in order to facilitate the inspection of the exhibition.

REV. J. B. KENNERLEY proposed "That arrangements be made for annual excursion parties of the Institutions in Union." He wished the conference to record its opinion that this was a matter desirable to be carried out.

MR. CHESTER said there were two points, which it was desirable should be kept separate. One was what should be done in this particular year. The facility for affording a good view of the exhibition was all important. There was no better teaching than that of the eye. That was a matter separate from future annual gatherings of institutions. For two years in succession he had brought forward the idea of the different institutions combining their excursions so as to have one great annual gathering. Last year, in reply to the circular of the Council, Mr. Blake moved that it was advisable to have a great gathering at the Crystal Palace on the 27th of August, and that the council should facilitate arrangements for excursion trains at low fares for three or four days. After considerable discussion that resolution was unanimously adopted. It was open for them to pass a resolution to-day that it was desirable to bring as many persons as possible connected with the institutions to see the exhibition. He thought that would certainly be the point of attraction for the present year.

After further conversation, in the course of which a

variety of suggestions were offered, the two following resolutions, prepared by the Rev. J. B. Kennerley, and duly seconded, were adopted:—

"That it is expedient that there should be an annual gathering of the Institutions in Union, at some place to be named from year to year."

"That for the present year it is most important that arrangements should be made for enabling the largest possible number of students and intelligent artisans to visit the International Exhibition, and that the Council of the Society of Arts be requested to afford any available facility for accomplishing this object."

The CHAIRMAN said the next subject on the paper was as follows:—

THE PROPRIETY OF DIRECTING THE ATTENTION OF THE COMMITTEES OF MECHANICS' INSTITUTIONS TO THE BEST MEANS OF RENDERING THEM PLACES NOT ONLY OF INSTRUCTION, BUT ALSO OF RATIONAL AMUSEMENT FOR THEIR MEMBERS. IN THIS WOULD BE INCLUDED THE QUESTION OF PROVIDING REFRESHMENTS.

MR. BARNETT BLAKE said a question of greater importance than this could not occupy the attention of those representing Mechanics' Institutions. It was a common reproach, particularly in the South of England, that Mechanics' Institutions were no longer what they professed to be by name. That the members of them, instead of being mechanics, consisted for the most part of clerks and book-keepers, who moved in a different class of life to those for whom these Institutions were originally intended. In Yorkshire, he was happy to contradict that statement, for, with reference to the operative classes, they composed at least 70 per cent. of the members of the Institutions—those who lived upon their weekly wages, and were neither clerks nor book-keepers. But with all this, there was still great complaint that they had not that influence over the working classes that it was desirable they should have. In Huddersfield there was a very successful institution, affording the benefits of class instruction in evening schools to 800 or 900 persons out of a population of 30,000, and yet he dared say they would be able to find a thousand working men in that town who could neither read nor write, although attempts were made by various individuals to stimulate a desire for those elementary branches of education. No one questioned how much better off a man was if he was able to read and write, but there was an absence of desire for those acquirements, and a reluctance to practice self-denial for the sake of obtaining them; and unless some step were taken in the right direction they would have a population growing up from year to year who had no other mode of spending their time than working hard during one portion of the day, and living like brutes that perish for the remainder of the day—no better at the week's end than they were at the beginning, and very little removed from those savages to whom were sent out missionaries. As a philanthropic question it was worthy of consideration whether Mechanics' Institutions might not be made more useful and more attractive to the working classes that they were at the present time. What was it the working man wanted? He went to the public house when he had done work. Did he go there merely for the sake of drink? He (Mr. Blake) believed in most cases he did not. He believed the great want of the working man in the present day was the means of social intercourse; but supposing a man to have no higher aspiration than that, he was in some measure repelled from gratifying it in the Mechanics' Institution. In Huddersfield they had a handsome reading-room; no talking was allowed. There was the first check. Men sat at the table deep in the mysteries of a penny newspaper. If a man talked too loud to his neighbour, another would complain that his studies were disturbed. That was the atmosphere of the Mechanics' Institution to which they wished to attract the working population of the country. Let them go where the enjoyment of a little recreation

was allowed, and where they stepped out of this rigid and uninviting course of action. In a little village near Redcar they had a working man's club, and the clergyman of the parish was the president, and in addition to the reading-room there was a smoking-room. Some persons objected to smoking and condemned it as a bad habit. It might be so in the abstract, but he was speaking of what was a strong inducement to the working man, and it was better, if a man would smoke, that he should smoke without drinking than that he should smoke and get intoxicated as well. If even that quiet recreation of smoking were introduced in connection with the institutions, many of these men after their day's work was over would be brought within the influence of the institutions, and they might before long be induced to give some thought to their own interests, but they were driven away from the institutions by the exclusive principles pursued there. Mr. Blake proceeded to give some further instances of beneficial results which had attended the introduction of recreative amusements, and went on to remark,—It was said that the Mechanics' Institutions were educational establishments. Let them remain so: but that was no reason why they should not combine the recreative feature. He had taken considerable interest in the formation of an Institution in a small place where smoking was allowed. That institution was patronised by a lady of high family, who remarked that she did not see any objection to smoking, as it would keep men out of the public-houses. They were not doing all he could wish in that Institution, but one great thing was, that when the day's work was over, they kept them from the public-house, and a penny per week was all the charge made to them. He wanted to recommend the Institutions in general to do something in this direction, because they must bear in mind that they could not deal with a working man as they could with a child. They must treat him with some regard to that feeling of independence which characterized the operative classes of this country. This subject was brought before the meeting of the Yorkshire Union, when the representative from Huddersfield stated that they introduced chess and draughts, but had abandoned them because bets were laid upon the games. Was a good thing in itself to be abolished because it was abused? Perhaps no better illustration in favour of recreative amusements in connection with Mechanics' Institutions could be afforded than the present state of the town of Sheffield, where the operative classes were engaged all day in labour exhaustive of the physical energies which they sought to recruit at the public-house, and it had also become a proverb that if any diabolical crime was committed it was at Sheffield. Why was it so? Because the men required some different treatment and some additional attractions to what they found in the Mechanics' Institutions of the present day. He had strongly urged the experiment in Sheffield, for the sake of the rising members of society if not of the older, that they should not be left to go on in a vicious career without an effort being made to redeem them, for he did not regard them as incapable of reform. After some further arguments in support of his views Mr. Blake concluded by moving the following resolution:—

“That in the opinion of this Conference, it is desirable that the managers of Institutions should, wherever practicable, make provision for the rational recreation of the members, so as not to interfere with, or lessen in any way, the means taken to promote intellectual cultivation.”

Mr. BENJAMIN SHAW (Greville House Working Men's Library and Reading Room) expressed his acknowledgments to Mr. Barnett Blake for his advocacy of this view, which he believed to be the thing to give these Institutions their full moral and beneficial effect. He confessed his own surprise and gratification at hearing from Mr. Blake that so large a percentage of the members of Institutions in the north consisted of the operative classes, because, judging from the generality of cases, he had almost arrived at the conclusion of Charles Dickens, that they

might as soon expect to find a dodo as a mechanic a member of a Mechanics' Institution. The only point on which he felt any doubt, was whether this plan ought to be applied to the making of Mechanics' Institutions more useful and attractive, or whether it should not be carried out apart from the Institutions themselves. He very much doubted whether the clerks and book-keepers in the south would be found to associate with the working men in the same Institution. For the last five years he had been secretary of an Institution, conducted in accordance with these views, Greville House, Paddington-green, where various amusements had been introduced. Upon the subject of music, he had no doubt great attraction existed in the musical entertainments which were given at public-houses, which formed almost the only opportunity of indulgence on the part of the working classes in an amusement for which they had a great partiality; and he thought the strong desire to form volunteer bands was deserving of every encouragement. He also mentioned the satisfactory results of a *soirée* which was attended by the wives and daughters of the members, and which was characterised by the utmost decorum of conduct. He thought such gatherings most valuable, as affording to the working man the means of enjoying that social intercourse which it was so difficult for him to obtain in any other way. Elocution classes were also very popular and attractive. Then there was another point, viz., amusements and exercise for those whose callings confined them and cramped their muscles. Such games as skittles or bowls might be properly introduced. It would be an easy matter for Institutions to obtain a large shed in which those games might be practised in the winter, so as to afford the men that bodily exercise which they required. With regard to refreshment, in the Institution to which he referred it was furnished in the shape of tea and coffee, and he thought this a very desirable adjunct. He was glad this subject had been introduced, because he thought from the want of some such plan as this many Institutions lasted for a year or two and then gradually decayed. One other reason, in his opinion, for the decline of these Institutions was that the lectures were of too high a character; indeed he was quite satisfied that they were trying to do too much in the way of education by lectures, which he believed would never be successful. A man coming away from his labour tired in body and in mind was not in a condition to profit a great deal by a high-flown lecture. Some accounts of foreign travel would interest a great deal more, and in the course of that they might introduce a good deal of useful information; but he did not put much faith in downright scientific lectures for working men. He did not say there should be no education in these institutions, but it required to be more systematic. By a system of classes they could see what a man did know; and if they had not courage to come to the Society of Arts for examination they could be examined in their own Institution. These were all educational elements which they should seek to keep up, and he was persuaded they could not better accomplish the objects they had in view than by rendering the Institutions as attractive as possible to the class for whom they were established.

Mr. AKROYD, in seconding the resolution of Mr. Blake, could bear out most of the observations made as regarded the character of the working classes in Yorkshire, and the necessity of some change in the organisation of mechanics' institutions. Hitherto they had been too much locked upon as scholastic establishments. They now found that they must attend not only to the educational wants but also to the social wants of the working classes—their recreation as well as their education. They had arrived at that growth of the Institutions that they might consider them in two aspects. A village institution might combine in itself all that was required in this respect; in large towns, however, the two systems, the educational and the recreative, could not be embraced in one institution. He had had considerable experience in this matter and would state

a few facts which might serve to guide the Conference in coming to a conclusion. They had first to consider the question of in-door amusement. He had in connection with his Working Man's College, a library and a reading room, and smoking in the evening was allowed in a room for that purpose. He attempted to provide tea and coffee, but this had been a failure. In other respects the Institution combined many features of the working man's club. He thought that the representatives from Yorkshire might learn something in these matters from the Metropolis. A few days ago he paid a visit to an Institution in Westminster, where there was a reading room not connected with the Institution, the subscription to was a halfpenny per week. Smoking was allowed in that room. In an upper room a Labourers' Loan Society was conducted. Beyond that was a reading-room, where smoking and talking were not allowed. That institution, he was informed, answered very well. At the time of his visit there were more than two hundred men present, who but for that institution would have been spending their time in the lowest pot-houses. This was all done apart from the Mechanics' Institution, and did not at all offend the feelings of those connected with it. Reverting to his own Institution, he would state that they had established a Literary and Philosophic Society and a Naturalist's Club, which made excursions into the country, and it was his practice to give prizes for the best collections of ferns and geological specimens. As to outdoor recreation, he thought they could only meet that by conducting the operations of the institutions on different systems, according to the seasons of the year. In summer time they did not open the Working Man's College every evening, only two or three times a week. They had a bowling green and cricket club, to which all the members had access. He apprehended there would be no difficulty in the mechanics' institutions in large townstaking a similar course. He quite agreed with the remarks that had been made as to the popular attractions of music. There was a singing class attached to his institution; and so strong was the love of music, that choral societies were formed independently of the institution, and in the winter time they got up oratorios in a very creditable manner. Much of this system, if not all, might be carried out in most mechanics' institutions. Going back again to the point from which he started, he would say they had now arrived at such a growth of mechanics' institutions, that they must be reconstructed so as to meet these wants of the people.

Rev. J. B. KENNERLEY gave a similarly satisfactory account of the proceedings of the Working Man's College at Salford, detailing the plans which had been carried out for the recreation of the members. The results, he said, had been in all respects as satisfactory as the promoters could have desired. With regard to the wording of the resolution, he suggested that it should apply to other institutions than Mechanics' Institutions.

Mr. BLAKE suggested the alteration to "Mechanics' and similar Institutions."

The SECRETARY said the words of the resolution were "Managers of Institutions."

Mr. CHESTER preferred that the word "mechanics" should not be introduced. He should be sorry that it should go forth that they were not as much interested in the class of clerks and book-keepers as in those engaged in manual operations. He rejoiced to see the members of that class flocking to the institutions, and also to their Examinations. Let them not, therefore, do anything implying that they were not as glad to serve the book-keeper and the clerk as the man engaged in manual labour. He was one of those who thought the mechanics' institutions ought to combine recreation with education, and when they talked of amusement, he regarded it in the broadest sense of the term, and he would say whatever amusements and games they thought suitable for their own class, if they could be brought within the reach of mechanics' institutions, let them have them there. Let each institution decide for itself what it considered the best kind of

amusement, and let there be freedom of action for all; and when they came to the subject of refreshment he suggested that they should expunge the word "harmless" inasmuch as in deciding upon that they trench upon a medical question which was beyond their province. When they went to their clubs they did not think it disgraceful to take a glass of wine or spirits and water. Why then should they restrict the poor man upon that point? All they desired to do was to keep him out of the public houses—not because they were not good things in their way, but because it was to the interest of the proprietors to tempt people to drink more than was good for them, and they were thus placed in a position of temptation to drink immoderately. He had no doubt in a year or two they would find that this plan of combining amusement with instruction would be more and more successful. In South Hants it had been attended with satisfactory results as far as it had gone, and the penny readings had been given with great effect. He said give instruction first and with it amusement.

Mr. W. O. FIELD said he had been instructed to support this resolution.

Mr. PARKER thought the word "rational," as applied to amusements, might be expunged equally with the word "harmless" as applied to refreshments.

The CHAIRMAN then put the resolution, which was adopted, with the omission of the word "rational."

Mr. BLAKE then proposed the following further resolutions, which were duly seconded and adopted:—

"That such recreation, whilst conducted so as to enable the largest possible number to share in it, should, at the same time, be restricted as far as practicable from any abuse."

"That in Institutions having suitable accommodation, arrangements might be made with advantage for the sale of refreshments at a moderate price."

Sir THOMAS PHILLIPS, being obliged to leave, requested Mr. Chester to take the chair, to which that gentleman acceded.

The next subject on the paper was

THE QUESTION AS TO THE LENGTH OF THE PERIODS FOR THE PAYMENT OF SUBSCRIPTIONS TO INSTITUTIONS.

Mr. BARNETT BLAKE moved that the pupils of evening classes be allowed to pay their subscriptions weekly, which was seconded by Mr. Bentley Shaw, and, after a brief conversation, was negatived.

SPECIAL LOCAL EXHIBITIONS AND LOCAL MUSEUMS.

Rev. J. B. KENNERLEY was of opinion that such exhibitions are desirable in places where none such already exist. He stated that in Salford they had a permanent museum and an annual exhibition.

Mr. TALBOT thought it desirable that localities should avail themselves of the grant of objects from the South Kensington Museum.

Mr. FIELD stated that two years ago, aided by contributions from South Kensington, a very successful exhibition was held in Gosport, which was attended by 16,000 visitors, and in the course of one month added £140 to the funds of the Institution.

The following resolution was then adopted:—

"That this Conference calls the attention of Institutions to the importance of establishing local museums and special local exhibitions by means of the efforts of the inhabitants of the various districts."

The last subject on the paper was as follows:—

THE EXPEDIENCY AND MEANS OF ESTABLISHING COMPETITIVE EXHIBITIONS BY ARTIZANS OF THEIR WORKS OF SKILLED LABOUR.

The CHAIRMAN (Mr. Chester), said he had drawn the following resolution on this subject:—

"That it is highly expedient to afford to artisans opportunities for the competitive exhibition of their works of skilled labour."

He said this subject was brought before the Conference

last year, and considerable interest was manifested upon it. It had been brought under the notice of the Society of Arts, in the first instance by the Painters' Stainers Company, who asked for the assistance of the Society in carrying out their object of an annual exhibition of works of this character, which was acceded to. It seemed to him of importance to encourage the men by whose hands the work was actually done, as was the case in agricultural societies by rewards to the best ploughmen, &c. In France prizes were given to the artizans who executed the work. It was desirable to get this question ventilated.

Mr. W. O. FIELD seconded the resolution, which was unanimously adopted.

The CHAIRMAN having announced that the subjects in the paper had been gone through,

Mr. BARNETT BLAKE said he had some resolutions to propose of a recommendatory character. The first was:—

"That in every county or district where no Union of Institutes at present exists, attempts should be made to form one under the auspices of an Institution centrally situate, so that the advantages of systematic examinations may be extended." He considered such Unions would be of great advantage in districts which were isolated from large towns, and men of energy were wanted to devote themselves to the subject.

Rev. J. B. KENNERLEY seconded the resolution.

The CHAIRMAN considered the subject of importance, and he had intended to have taken some steps upon it.

Mr. TALBOT thought there was no necessity for the words "under the auspices of an Institution." In South Staffordshire they had a union without being under the auspices of any particular Institution. It was established two years ago, and had been very successful.

Mr. BLAKE said the question was, who was to undertake the work unless it were done by some Institution.

The resolution was adopted with the omission suggested by Mr. Talbot.

Mr. BLAKE then moved the following resolution:—

"That it is desirable to make some arrangements between Institutes situate at convenient distances, for the joint employment of competent teachers of evening classes, and especially to establish science classes under the instruction of teachers holding the certificates of the Department of Science and Art." He considered that by this means Institutions might get the assistance of really good teachers for once or twice a week. They must have competent teachers if they wanted the educational movement to work well.

The resolution having been seconded,

The CHAIRMAN said on the first point they must all agree, but he thought upon the question of the teachers requiring to have the certificate of the Department of Science and Art there might be a difference of opinion.

Mr. REDGRAVE remarked that many teachers would not go up for the certificates.

Mr. BLAKE said the object of the resolution was to call attention to the advantages of the certificates of that Department.

The CHAIRMAN said they discussed a somewhat similar proposition last year, and it was then negatived. He thought it was not for the Conference to point out what teachers should be engaged, nor did he think they were called upon to affirm that the teachers holding the certificates of the Department of Science and Art were better qualified for their duties than those who did not hold them. They ought not to put forth the idea that these were the best teachers in the country.

Mr. BLAKE said the point was not whether these were the best teachers, although he could not but think it was an advantage for a man to hold the certificate of the Department of Science and Art. They had only to go up and get the certificate. Institutions to do any good must have able teachers.

Mr. BROOKS spoke in support of the resolution.

Mr. TALBOT said, having attended these Conferences for five or six years, this was the first time he had ever heard

the attempt made to adopt the principle of affirming that one set of teachers were better than another, and he deprecated that principle. He might feel himself as competent to teach some subjects without the certificate of the Department of Science of Art as those who held it.

After a further conversation the resolution was adopted with the omission of the last clause, referring to the Department of Science and Art.

Mr. BLAKE said he had one other resolution to propose, which was as follows:—

"That the Council of the Society of Arts be recommended to devote a portion of the *Journal* to the Institutes, and invite communications on the subject."

After some conversation, during which it was pointed out that a portion of the *Journal* was already devoted to the "Proceedings of Institutions," and that the Council were very desirous to receive communications for insertion, the above resolution, modified as follows, was adopted:—

"That this Conference calls the attention of Institutes generally to the great value of the *Journal of the Society of Arts*, as a medium through which the special interests of Institutes may be promoted, and invites more frequent communications on the subject."

Rev. J. B. KENNERLEY moved that phonography be added to the programme of the Society's Examinations, but after a short conversation, in which the difficulties of a satisfactory system of examination were pointed out, the motion was withdrawn.

Mr. BARNETT BLAKE proposed a vote of thanks to Sir Thomas Phillips and Mr. Chester for presiding over the Conference, which was seconded by Mr. Talbot and carried by acclamation.

Mr. CHESTER briefly acknowledged the compliment, and the business of the Conference terminated.

ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

At the last ordinary monthly meeting of the Executive Committee of this Association, on Tuesday, June 24th, Hugh Mason, Esq., Vice President, in the chair, Mr. L. E. Fletcher, chief engineer, presented his monthly report, of which the following is an abstract:—

"During the last month there have been examined 224 engines—5 specially; 400 boilers—9 specially, 8 internally, 68 thoroughly, and 315 externally; in addition to which 7 of these boilers have been tested by hydraulic pressure. The following defects have been found in the boilers examined:—Fracture, 5 (2 dangerous); corrosion, 43 (7 dangerous); safety-valves out of order, 7; water gauges, ditto, 11; pressure gauges, ditto, 6; blow-off cocks ditto, 36; fusible plugs ditto, 3; furnaces out of shape, 6 (1 dangerous); over pressure, 4; blistered plates, 4; Total, 125 (10 dangerous). Boilers without glass water gauges, 8; without pressure gauges, 5; without blow-off cocks, 7; without back pressure valves, 26.

"No explosion has happened during the past month to any boiler under the inspection of this Association, neither have I heard of the occurrence of any in other parts of the country.

"Advantage has been taken of the very general stoppage of the works during Whit-week to make as many "internal and thorough" boiler examinations as possible, the ordinary routine of visits being entirely laid aside in order that the inspectors might exclusively devote themselves to this special branch. Applications for these examinations have this year been so numerous that the inspectors were incessantly occupied upon them during the whole week, notwithstanding which, however, a few late applications could not be complied with. Members might avail themselves of any holidays peculiar to their own district for securing these "internal and thorough" examinations. Early applications should in all cases be made for the visit of inspection.

"Several cases of extensive corrosion were revealed by

these examinations, and which attested to what a dangerous extent they are too frequently postponed. In one instance, the plates at the bottom of a boiler were so reduced in thickness, that the engine attendant feared lest the removal of the cake of incrustation should rob them of so much assistance as to prove fatal to the integrity of the shell.

"I find it necessary again to repeat that it is absolutely imperative, if these examinations are to be satisfactory, that the flues should be thoroughly swept, and the boilers suitably prepared, otherwise the condition of the plates cannot be ascertained; while, on the score of economy, I would remark, in passing, that our members can scarcely be aware of the amount of fuel wasted by allowing the plates of their boilers, while in work, to be coated with so non-conducting a substance as soot. Feed water passed through heaters loses 30 degrees of its temperature within a week after sweeping, while the utility of the heater is almost lost if allowed to go unswept for a longer period. This will give some idea of the loss occasioned to boilers by neglect, and I have found the soot to hang from the surface of the plates in complete festoons immediately after the flues themselves had been passed as swept.

SAFE WORKING PRESSURE OF BOILERS, AND HOOPING OF FLUES.

"For some time since I have been desirous of touching upon the point of Safe Working Pressures for boilers, since it not unfrequently happens that it is necessary to warn our members on account of excess.

"The scale adopted by the Association as a general standard is as follows:—For shells of boilers 7 feet in diameter, made of $\frac{3}{8}$ th plate, the Safe Working Pressure 50lb.; if of $\frac{7}{16}$ th plate, 60lb.; and other dimensions in proportion. This allowance corresponds with the general practice of the manufacturing engineers of the district, is quite as high as the standard in other parts of the country, and considerably in excess of that permitted either in France, Holland, or Belgium, by their respective governments. It must, however, be distinctly understood that this standard should not be applied arbitrarily in every case, without any allowance being made for the attendant circumstances. It is only applicable in cases where the boiler is well made, both as regards materials and workmanship, and where the condition of the plates is good. It would be highly dangerous to apply it to boilers weakened by the wear and tear of years; while, on the other hand, a new and thoroughly well made boiler might for a time be allowed to work at a pressure slightly in excess of that given. But this could only be safe where everything is in first-rate condition.

"It is a very common idea that the bursting pressure of a boiler is six times as high as that given above as its safe working pressure. This, however, I am persuaded, is a great mistake, and leads in many cases to undue confidence. I am confirmed in this conclusion by the constant examination of the rent plates in boilers that have exploded, where I find that, even where explosion results from thinning of the plates, rupture ensues long before they are reduced to one sixth of their original thickness, and in one case I knew a well made and nearly new boiler, in first-rate condition, to explode, on account of only a comparatively slight increase of pressure, which had accidentally been allowed through an error in the steam gauge. In this case, that at which the boiler actually burst did not exceed its ordinary working pressure by more than 50 per cent., the one being about 90lb. the other 60lb. I believe that an application of anything like six times the pressure given in the scale above, would burst most of the boilers in Lancashire, and where it has been actually attempted by hydraulic pressure, the steam domes have been found to tear off long before the strain referred to has been attained. I cannot, therefore, think that shells of cylindrical boilers can be worked without risk at a higher pressure than that given in the preceding scale, unless under very exceptional circumstances.

"With regard to the Furnace Tubes which are exposed to external pressure, I am glad to find that the practice is becoming increasingly general of strengthening them either with flanged seams or hoops, the hoops being made either of angle iron, T iron, or other approved form; and since it too frequently happens that flues are not made in the first instance truly cylindrical, on which their strength so much depends, and that other sources of weakness creep into the manufacture unawares, it is extremely desirable that no new boiler should be constructed with flues unstrengthened in the way just described, however slight the working pressure may be.

"These hoops are frequently added to boilers after their first construction, and since some of our members have suffered inconvenience from the imperfect manner in which they have been fixed, I may state the method found by experience to be the best, which is as follows:—The hoops, if made in two halves, may be passed in through the man-hole, and then be secured to the furnace tubes when in position. They should not, however, be brought in direct contact with the plates of the tube, but should have ferrules of about an inch thick placed between the two, so as to leave a clear space all round through which the water can circulate. Where this space has been omitted, the plates have been found in some places to crack at the rivet holes, and in others to blister and buckle, in consequence of which many plates have had to be cut out and the hoops removed, from which the system of hoopsing has been in some cases unfairly condemned. Where, however, the ferrules have been introduced and the water space allowed, no injury has been found to arise to the plates even over the hottest part of the fire. The rivets uniting the hoops to the furnace tube should pass through these ferrules, and be spaced about six inches apart, while the two halves of the hoops should be connected together by butt strips riveted to their ends at the back. When hoops are applied as an after-clap in this way, angle iron is preferable to T iron, as the flange, being narrower, is less liable to cause overheating of the plate. It may be necessary to vary the size of the angle iron in some cases, but, generally speaking, one three inches in the flange and half an inch in thickness will be found to answer every purpose. It is sometimes the practice to put two angle irons back to back. This is quite unnecessary, and a single one is all that is required. A drawing, to show the arrangement recommended, has been made for the assistance of the members, and can be seen on application at the offices of the Association.

"Since writing the above, I have met with some additional cases, where considerable expense has been incurred by having to remove angle iron hoops from furnace tubes, in consequence of the injudicious mode in which they have been fixed, and would therefore impress upon our members the importance of attention to the above, if they wish to prevent the recurrence of disappointment in their own case."

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(Continued from page 483.)

SYRIA (TURKEY).—The following is a Report by Mr Moore, British Consul at Beyrout, on the capabilities of Syria for the production of cotton.

The movement which lately commenced and continues in England, for the encouragement of the culture of cotton in different parts of the world, induces me to submit some information as to the extent to which that article, so vital to the prosperity of Great Britain, could be raised in Syria.

The cotton plant has been produced in different districts of Syria for ages, but owing to the defective mode of culture, and the seed not being changed, the quality has degenerated, so as to become very inferior to that of Egypt or America.

A recent experiment, however, made in Palestine, with American cotton seed, has proved that this country is as well adapted for the growth of cotton as the United States. A sample of the quality raised from this seed was sent from London, and pronounced by competent judges there to be fully equal to American growth; and I have as little doubt that if Egyptian seed were introduced the quality would probably equal that of Egypt.

The improvement in the quality of silk in Syria since the introduction of silk-worms and machinery from Europe, proves the correctness of the assertion as regards cotton. Only a few years ago the raw silk of this country was of a very inferior description, while it now rivals the first quality of French and Italian silks.

The Syrian cotton has hitherto been produced without irrigation; that of Egypt and America, as experience has proved, requires water.

The localities in Syria now waste, where water is abundant and the soil most fertile, are numerous, and they could easily be converted into a most valuable field for the supply of cotton for the English market, while at the same time the Sultan's revenues would be increased and the general condition of the inhabitants greatly benefited.

What is alone required is a grant of Crown lands now neglected, both in the south and north, to a company for a period of years. Such a speculation, besides possessing the advantages already adduced, would, I have every reason to believe, be highly remunerative to the parties engaged in it. It is only through foreign enterprise, by means of combined capital, supported by British influence, that these changes can be effected.

I subjoin a list of the localities where cotton could be raised to almost any extent, of a quality equal to that of any in the world.

The following are districts in Syria now for the most part lying waste, where cotton might be advantageously cultivated to a vast extent:—

The sources of Banias (Jordan), Valley of the Bekaa and Baalbec, sources and banks of the Orontes; plains beyond Damascus; that part of Mesopotamia on both sides of the Euphrates, chiefly waste lands.

The plains in the vicinity of Alexandretta and Tarsous.

The Nablous and Anagreath mountainous districts, which produce cotton without irrigation, water being scarce.

Home Correspondence.

THE ANNUAL GENERAL MEETING.

SIR,—The report of the annual meeting given in last week's *Journal* is a most meagre one—and affords a very incorrect idea of what was said on the affairs of the Society. For instance I did not say that the *Journal* "was generally not well conducted, and did not possess sufficient interest," while what I did say is not given at all. I expressed no opinion on the question raised by others as to whether the *Journal* was an interesting publication or not. With reference to the discussion on its expense to the Society, I shewed that the £1162 charged in the accounts was not all its cost, for that no credit was given for the large number of advertisements; and I said that as the Society did not appear to receive the money for these, their value must be taken into account in reckoning what the *Journal* really cost the Society. I also asked for the terms of the contract for printing and publishing the *Journal*.

I further pointed out a very important error in the report of Lord Granville's remarks on the evening when Mr. Hawes's paper on the International Exhibition was read, and I asked who was the responsible Editor of the *Journal*.

Again, the *Journal* gives a most incorrect version of the allusion I made to the paper on the effect of prizes, read at one of the ordinary meetings. I did not go into the

general subject of that paper at all, but I simply quoted the following sentence from it: "One of the most prominent and energetic members of the Society of Arts often says, that the only inventive result of the long list of prizes given by the Society during more than 100 years, which he has been able to discover is, 'The shilling colour box.'" I expressed my astonishment at this unfounded statement, actually made at a meeting of the Society in its own house, presided over on that occasion also, by "one of the most prominent and energetic members" of the Council, who took no pains to correct the mis-statement. I briefly quoted some of the facts to prove the fallacy of the above quotation.

In this letter I have carefully confined myself to giving a correct idea of what I did say at the meeting, and in simple justice I claim its insertion in the next number of the *Journal*.

I am, &c.,
J. H. MURCHISON.

PREVENTION OF RAILWAY ACCIDENTS.

SIR,—The frequent occurrence of railway accidents induces me to make some suggestions, which I hope may be beneficial, and be the means of preventing them to a certain degree. Every one of the sad catastrophes we hear and read of, is placed under the head of accidents. These accidents may be divided into two great classes, 1st. Those from carelessness; and 2ndly, Those from want of completeness in the mode of transit. The first may be subdivided into various kinds, and may be disposed of summarily with the old answer, "Couldn't help it;" and there they will remain until we hear better, see better, know better, and are as perfect in our own mechanism as the machinery we travel by. Now for the second great class. In looking over the engines in the Exhibition, a thought must strike everyone how very much larger and heavier the engines are becoming compared with the carriages they have to draw. The reason is obvious. Look now to the construction of the rails on which the heavy and the light carriages travel. Can we trust to the support of both alike? I think not. Again, in almost every line of railway I have found more or less lateral movement. The causes of this may vary. Further, what keeps the carriage from running off the rail? A flange about an inch deep. Then is it not probable that the heavier weight depresses its portion of the rail to more than an inch below the level of the lighter carriage; that a lateral movement at the moment takes place, and the carriage runs off the line of the (heavier) engine? Thus, this possibility appears to me to be a clear want of completeness in the present mode of transit. To remedy this, I propose that a third, or middle line of rails be laid down, to be kept entirely as a guide line for the carriages only, each carriage to be supplied with a fore and aft wheel, provided with a double flange.

I am, &c.,
COSMO GORDON LOGIE, M.D., F.S.A.,
Surgeon-Major, Royal Horse Guards.
Hyde-park Barracks, 1st July, 1862.

Proceedings of Institutions.

BURY ATHENÆUM FOR THE DIFFUSION OF USEFUL KNOWLEDGE.—The ninth annual report states that the Athenæum has stood its ground in the face of formidable competition. Various matters have been considered by the directors during the past year with a view to add to the efficiency of the Athenæum. Amongst these was the resolution adopted at the last annual meeting, recommending to the directors the propriety of establishing a coffee-room and conversazione in connection with the Athenæum, so as to introduce more of the social element. The directors, however, after a very full consideration of the subject, and after making inquiries as to the experience

of other institutions where such things have been tried, came to the conclusion: "That the difficulties in the way of establishing a coffee-room are so many that they do not see the possibility of carrying it out without entailing loss on the institution." The idea was therefore abandoned. They also considered the propriety of getting telegraphic news posted in the Athenæum, but found the expense greater than the benefit. The number of members has not been so great as in last year. The decrease has taken place in both the annual and quarterly subscribers, but chiefly in the quarterly. The following tabular statement will give the numbers each quarter during the year, also the numbers in each of the corresponding quarters of the previous year:—

	Life Members.	Annual Members.	Adult Quarter.	Junior Quarter.	Female Quarter.	Hon. Member.	Total 1861.	Total 1862.
First Quarter	35	37	264	55	47	1	439	521
Second Quarter	35	47	263	48	38	1	437	475
Third Quarter	35	54	225	38	17	1	370	438
Fourth Quarter	35	63	275	69	38	1	481	538

Notwithstanding the decrease in the number of members referred to, the finances are in an improved state. The income during the past year from members' subscriptions amounted to £187 9s. 9d., being nearly £31 less than in the previous year. The income for the letting of the hall and other rooms was the highest that has ever been received, £104 11s. 7d., being a little higher than in 1860. The expenditure, on the other hand, has been less in many respects than in the previous year, and, as a consequence, the directors are happy to report that the balance standing against the Athenæum has been reduced at least £40. The balance owing on the 31st December, 1860, was £277 4s. 5d.; on the 31st December, 1861, £228 1s. 6d. The attendance at the elementary classes during the past year has not been very encouraging, owing probably partly to the formation of evening classes in connection with many of the Sunday Schools and also the co-operative stores, where the instruction is gratuitous; and partly to the fact that Mr. James Duckworth who taught the classes (for writing, arithmetic, and English grammar) gratuitously, and much to the satisfaction of the directors, was under the necessity of discontinuing his services in the middle of a quarter. This led to the suspension of these classes till about the end of the third quarter, when Mr. Samuel Holt, of Rochdale, was appointed teacher on a salary, and it is gratifying to report that the classes have improved in numbers. Mr. John Thomas Furness and Mr. Zachæus Duckworth attend to the junior sections for writing and arithmetic. The directors, however, are of opinion that the time seems gone for elementary classes (as theirs have been) to be carried on successfully in connection with mechanics' institutions and athenæums. The only safe course to be adopted seems to be to form no class unless it can be made self-supporting. And the directors have for this reason been obliged to suspend the female writing and reading class which was under the superintendence of Mrs. Gornall. They also regret to say that the class for the study of the fine arts, under Mr. Hammersley, was also given up in consequence of the small number of pupils who joined, and the very heavy fees which thereby became due from each. The directors cannot notice this without equal regret for the institution and gratitude to Mr. Hammersley. The state of the mechanical and ornamental drawing classes, which meet the Wednesday afternoon and evening, is very satisfactory. Mr. Robert Routledge, of the School of Art, Manchester, is the teacher. The attendance during the year has been:—First quarter, 30; second, 21; third, 28; fourth, 35. This class is entirely self-supporting. The French and Latin classes, under Mr. Poolevin, have had an attendance of 19, 18, 12, and 12, throughout the respective quarters of last year. Mr. Arthur Webster has conducted dancing classes on terms satisfactory to the directors. The members of these classes generally are persons who would not

be members of the Athenæum were these classes not connected with it. The arrangements entered into with Messrs. W. H. Smith and Son for a supply of new books to the library, have not been renewed; many members having expressed an opinion that the better plan would be to purchase such books as were required for the use of the Athenæum. This course the directors decided to adopt, and the library committee have made selections of books. If future boards of directors could give pecuniary assistance to this department of the Athenæum, it is believed that much good would result. There has been a considerable diminution in the circulation for the year, it being upwards of 2,000 volumes less than in the former year. This may be accounted for by the formation of other libraries, one of which is free. It appears that 9,395 volumes have been issued during the year; giving an average weekly circulation of 184 volumes. Of these three-fourths have consisted of light reading, Literature, Novels, Romances, &c. The news room continues to be very well attended. The course of lectures commenced at the latter end of the preceding year, was concluded in the early part of the past year, by the delivery of lectures on "Natural History," by William Kidd, Esq.; "The Cotton Supply," by G. R. Haywood, Esq.; and "Botany," by Leo H. Grindon, Esq. Those lectures were better attended than lectures of an educational class, in years gone by, but the attendance was not such as to justify another course of a similar character this year. In conclusion, the directors submit to the consideration of the friends and supporters of these institutions, that the Athenæum is placed in much altered circumstances. As to the news room and library, they have formidable rivalry in two institutions; in one of these, they can devote about £20 a quarter to the news room, and in such a way, as to make it practically gratuitous to members, and also about £10 or £12 a quarter to the library in a similar way. And as to elementary classes, they have an enlarged competition, not only in Sunday schools, but in the co-operative stores, where there are 50 young men attending two evenings a week, without any charge. They mention these things as facts, and facts, too, on the side of progress. In these circumstances it has been suggested in reference to the elementary department, whether instead of elementary classes, an aim should not be made to form classes of a somewhat higher order, such as history, natural history, English history, &c.—in a word, to convert the institution into a "People's College." The directors do not reason on this position, but throw it out for consideration.

MECHANICS' INSTITUTION, LOCKWOOD.—The usual entertainment took place on Saturday evening, the 14th June, in the room of the institution. Mr. Nathaniel Berry occupied the chair. The recitations were contributed by the members of the Elocution Class, and the music by the members of the Singing Class. The music was well selected and the recitations, as on former occasions, were both humorous and instructive. Messrs Dawson and Swift sang the duet the "Army and Navy." The meeting broke up soon after ten o'clock.

MEETINGS FOR THE ENSUING WEEK.

MON.....Entomological, 7.
 Royal Inst., 2. General Monthly Meeting.
 Geologists' Assoc., 7. Professor Tennant, "On Diamonds."
 WED....Literary Fund, 3.
 SAT.....Royal Botanic, 3½.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par
 Numb.

Delivered on 4th and 5th June, 1862.
 245. East India (Home Accounts)—Paper.
 255. Wine—Account.

287. Public Works (Ireland)—Account.
 141. Bills—Ballot at Municipal Elections.
 147. „ Chancery Regulation (Lords Amendments).
Delivered on 6th, 7th, 11th, and 12th June, 1862.
 281. Fisheries (Ireland)—Return.
 289. Paper—Return.
 279. Charitable Donations and Bequests (Ireland) Bill—Return.
 300. Constabulary (Ireland)—Paper.
 307 (A.) Poor Rates and Pauperism—Return (A.).
 308. Railway and Canal Bills—Tenth Report from General Committee.
 292. Dwelling Houses, &c. (Scotland)—Return.
 301. Tyne Improvement—Returns.
 309. Female Adult Paupers—Return.
 311. Malt, Barley, and Hops—Returns.
 259. East India (Straits Settlements)—Return.
 295. Army and Militia Services—Return.
 302. Shipping—Returns.
 312. Poor Relief (Lancashire, &c.)—Returns.
 145. Bills—Drainage (Ireland) (as amended by the Select Committee).
 146. „ Burials (as amended by the Select Committee).
 150. „ Discharged Prisoners' Aid (amended).
 149. „ Harbours Transfer.
 148. „ West Indian Incumbered Estates Acts Amendment.
 Mr. Watson Taylor—Correspondence.

SESSION, 1861.

- 324 (D). Poor Rates and Pauperism—Return (D.).
Delivered on 13th June, 1862.
 255. East India (Army)—Return.
 313. Exports (France)—Return.
 131. Bill—Industrial and Provident Societies (amended).
 Lagos—Additional Papers.
 Public General Acts—Cap. 22 and 23.
Delivered on 14th and 16th June, 1862.
 290. Votes of Credit (China War)—Account.
 320. Declaration of Title Bill, &c.—Lords Report.
 286. Kilconcouse Lands—Return.
 299. Scottish Universities—Papers.
 152. Bill—Portsmouth Fair Discontinuance.
 Defence Commissioners (Forts at Spithead)—Report and Minutes of Evidence.
Delivered on 17th June, 1862.
 296. Harwich Harbour—Report from Committee.
 314. Kertch and Yenikale—Return.
 151. Bills—Poor Removal.
 153. „ Industrial and Provident Societies (as amended in Committee, and on Re-commitment).
Delivered on 18th June, 1862.
 249. Mersey Docks and Harbour Board—Abstract of Accounts.
 322. School Inspectors—Copy of a Memorial.
 326. National Defences—Return.
 164. Bill—Petroleum.
Delivered on 19th June, 1862.
 306. Burials Bill—Minutes of Proceedings of the Select Committee.
 316. Foreign Sugar—Account.
 323. Sheep (Ireland)—Return.
 328. Mr. Saxe Bannister—Papers.
 155. Bill—Coal Mines.
Delivered on 20th June, 1862.
 304. Theological Professors (Belfast), &c.—Return.
 318. Public Records—Return.
 333. Court of Chancery—Copy of General Orders and Rules.
 334. Wheat, Flour, and Malze—Returns.
 156. Bills—Pier and Harbour Orders Confirmation.
 157. „ Judgments, &c., Law Amendment.
Delivered on 21st and 23rd June, 1862.
 329. Population, &c. (Scotland)—Abstract Return.
 335. Bankruptcy—Return.
 330. Army (Chaplains, &c.)—Account.
 342. Volunteer Forces (Australia)—Return.
 343. Sydney Branch Mint—Return.
 140. Bills—Roman Catholic Prisoners.
 159. „ Sale of Beer, &c.
 Defence Commissioners (Fort behind Plymouth Breakwater)—Report.
Delivered on 24th June, 1862.
 266. East India Communication—Report and Evidence.
 332. Chamber of London—Annual Accounts.
 158. Bills—Chancery Regulation (Ireland).
 161. „ Sheep (Ireland).
 Jamaica Debt—Correspondence.
 Fiji Islands—Correspondence.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

- Dated 11th June, 1862.*
 1736. J. D. Wake, Cornhill—Imp. in the construction of ships and vessels.
 1740. D. Crichton, W. Donbavand, and D. Crichton, Manchester—Imp. in looms for weaving.

1742. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in cradles or swing cots. (A com.)
 1744. J. E. Holmes, South-parade, Trafalgar-square, Chelsea—Improved machinery for cultivating or harrowing land. (A com.)

Dated 12th June, 1862.

1746. J. Ingham, and W. P. Wood, Bradford—Imp. in preparing colouring matters for dyeing and printing.
 1748. F. Tolhausen, 17, Rue du Faubourg Montmartre, Paris—A new or improved surgical injecting apparatus. (A com.)
 1750. H. S. Firman and W. Williams, 73, Great Suffolk-street, Southwark—Imp. in apparatus for cutting up and preparing as food or chaff for animals or any other purpose, straw, hay, corn-stalks, roots, and all other similar substances. (A com.)
 1752. A. Salvati, Great Portland-street—An improved mode of producing indestructible inscriptions and ornamental surfaces in gold and other precious metals. (A com.)
 1754. M. Jackson, Curtain-road, Shoreditch—An improved shield for the gums, to protect them from injury when cleaning the teeth.

*[From Gazette, June 27th, 1862.]**Dated 17th April, 1862.*

1131. H. Gallagher, Bermondsey—Imp. in overalls, leggings, or in overboots.

Dated 5th May, 1862.

1329. T. Wilson, Birmingham—Imp. in the manufacture of armour plates for ships of war and batteries, and in fastening or securing armour plates to ships of war and batteries.

Dated 26th May, 1862.

1572. W. Clark, 53, Chancery-lane—Imp. in the manufacture of buttons, and in the mode of fastening the same. (A com.)

Dated 27th May, 1862.

1595. C. H. Hudson, Roxbury, U.S.—Imp. in defensive armour.

Dated 29th May, 1862.

1611. J. Hirst, jun, Dobcross, Saddleworth, and J. Wood, Birkby, Huddersfield—Imp. in stereoscopic apparatus.

1615. J. D. Lee and J. Crabtree, Shipley, near Bradford—Imp. in looms for weaving.

1617. C. D. Abel, 20, Southampton-buildings, Chancery-lane—Imp. in apparatus for raising, propelling, or exhausting air, water, or other fluids or gases. (A com.)

1619. J. Paterson, Wood street—An improved hammer or instrument for turning over the edges of a binding or strip of linen or other material, and preparing it for stitching in sewing machines.

1620. W. Clark, 53, Chancery-lane—An improved method of throwing the shuttles of looms. (A com.)

1621. N. Lawton and R. P. Whitworth, Stalybridge, Chester—Imp. in engines for carding cotton and other fibrous materials.

Dated 30th May, 1862.

1623. W. Footman, 5, Great Queen-street, Westminster—Imp. in the treatment and use of sewage and liquid manures, and in reservoirs and pipes to be used therein.

1627. R. Nicholson, Copt Hewick, Ripon—Imp. in the construction of lawn mowing machines.

1629. J. Morrison, Birmingham—Imp. in the construction of springs suitable for ladies' dresses or crinolines, and for chair, sofa, and other seatings, as well as for bedstead and couch sackings.

1631. H. P. Burt, Charlotte-row, Mansion-house—Imp. in protecting wooden posts from decay, more particularly applicable to posts for supporting electric telegraph wires.

1633. T. N. Pengelly and W. Byron, Charlotte-street, Whitechapel—Imp. in apparatus for hoisting goods.

1635. R. E. Loft, Troston, Bury St. Edmunds—Imp. in small fire-arms and cartridges.

Dated 31st May, 1862.

1637. A. Gilbey, Oxford-street—Imp. in the construction of packing cases or boxes for holding bottles either full or empty.

1639. G. Ermen and R. Smith, Manchester—Certain imp. in machinery for spooling and balling sewing threads, silk, yarn, and other like fibrous materials.

1643. Major-General R. Shortrede, Brighton—Imp. in presses for pressing cotton and other articles.

1645. H. Watson, Newcastle-upon-Tyne, and J. Millbourn, Dartford, Kent—Imp. in pulp strainers or knoter bottoms.

1649. G. C. Lingham and J. Nicklin, Birmingham—An improved crinoline connector and suspender.

Dated June 2nd, 1862.

1655. J. King and J. Partington, Moss Mill, Rochdale—Certain imp. in looms for weaving.

1657. A. J. Sax, Paris—Imp. in kettle, big, or other drums.

1658. T. Campbell, Leeds—Imp. in apparatus for "witnessing" piled fabrics.

1659. C. H. Roeckner, Marsh-street, Bristol—An improved method of constructing coffer dams and other similar structures for excluding or keeping back the flow of water and preventing inundations.

1661. J. Key and F. Potts, Birmingham—Certain means of producing designs in iron, and in the application of the same or designs formed in like manner of other metals to the manufacturing and ornamenting of bedsteads and other metal articles of furniture.

1662. J. Whitworth, Manchester—Imp. in shells.

1665. E. Lloyd, Bow Paper Mills, Middlesex—Imp. in machinery for the manufacture of paper.

1667. J. Marson, Birmingham—A new or improved projectile for small arms and ordnance of every description.

Dated 3rd June, 1862.

1671. W. H. Hall, Birmingham—Imp. in miners' safety lamps.
1673. J. Biers, jun., 5A, Tottenham-court-road—Imp. in shoes for horses and other animals.
1675. J. L. Norton, Belle Sauvage-yard—Imp. in machinery for raising and forcing water.

Dated 4th June, 1862.

1677. A. H. Perry, Brighton—Imp. in fastenings for and in the method of fastening together or securing railway chairs or sleepers, and for other similar purposes.
1681. T. Allcock, Ratcliffe-on-Trent, Nottingham—Imp. in the construction of horse racks.
1683. G. Allibon and E. Snell, Lewisham, Kent—Imp. in surface condensers and superheaters.
1685. I. Battinson and G. Battinson, Halifax—Imp. in machinery for combing wool and other fibres.
1687. F. P. Preston, Counter-hill, New Cross, and C. Goodman, George street, Deptford—Imp. in the permanent way of railways.
1689. S. Huston, Deeping St. James, Lincolnshire—Imp. in safety valves.

Dated 5th June, 1862.

1697. J. Keatley and J. Tangey, Birmingham—An imp. in lifting jacks.
1698. R. Sill, jun., jun., Birmingham—An improved method of attaching direction cards, name plates, or other cards or plates to trunks, packing cases, and other articles.
1699. P. M. Parsons, Blackheath—Imp. in ordnance, and in tools for rifling the same, parts of which imps. are applicable to small arms.
1701. E. Conroy, Drummond-street, Euston-square—Improved machinery for cutting corks, bungs, and such like articles.
1703. W. E. Newton, 66, Chancery-lane—Imp. in the construction of organs and other wind instruments, parts of which improvements are also applicable for regulating the pressure and flow of gas and air. (A com.)

Dated 6th June, 1862.

1705. E. Deane, Leicester—Imp. in road locomotives or traction engines.
1707. W. R. Jeune, Flower-terrace, Campbell-road, Bow—Imp. in the manufacture of fabrics suitable to be used as substitutes for solid leather.

Dated 7th June, 1862.

1710. A. J. Adams, Devonport—An improved method of rifling fire-arms.
1711. G. D. Haston, Manchester—Imp. in presses.
1713. C. Hook, Bridgway—Imp. in the construction of steam-engines.

Dated 9th June, 1862.

1715. W. H. Turner, Blackburn—Imp. in engines for carding cotton and other fibrous materials.
1719. J. M. Ryo-Catteau, 42, Bridge-street, Blackfriars—Imp. in machinery for twisting wool, cotton, flax, silk, and other fibrous threads.
1721. F. Giachosa, Guy's Cliff-villa, Warwick—Imp. in ventilating mines, ships' holds, and other places.
1723. A. Knowles, Birstal, near Leeds—Imp. in apparatus for washing extracted wool and other fibre.

Dated 10th June, 1862.

1727. J. A. Pols, Nye's Wharf, Grand Surrey Canal, Old Kent-road—An improved method of refining oils.
1728. N. Davis, 25, The Cedars, Putney—An improved propeller for ships or vessels.
1729. G. T. Jourdain, St. Paul's-terrace, Canonbury—Imp. in treating cocoa-nut oil.
1731. J. Alison, Brightlands, Reigate—Imp. in harrows, and in the apparatus for steering or guiding of such and other agricultural implements.
1732. J. B. Ingle, 37, King William-street—Imp. in reaping and mowing machines. (A com.)
1733. G. Appold, Wilson-street, Finsbury-square—Improved apparatus for regulating the discharge of water and other liquids and air and other cases.

Dated 11th June, 1862.

1735. W. Lennan, Dawson-street, Dublin—An improved safety stirrup.
1737. H. Bland, Stuart-street, Luton, Bedfordshire—Imp. in sewing machines.
1739. W. Crook, Blackburn—Imp. in looms for weaving.
1741. J. Marsh, New Sneinton, near Nottingham—Imp. in the manufacture of lace, and in the machinery employed therein.
1743. B. W. Gerland, Newton-le-Willows, Lancashire—Imp. in the manufacture of sulphate of copper, and in obtaining metals from the material used in such manufacture.
1745. J. Hetherington, Manchester—Imp. in lubricating revolving surfaces.

Dated 13th June, 1862.

1756. G. Haseltine, 100, Fleet-street—Imp. in the construction and application of rails for railways. (A com.)
1758. J. Wilson, T. Albert-square, Clapham-road—Imp. in the construction of ships for war purposes, applicable also to the mercantile marine.
1760. C. A. Tyler, Birmingham—A new or improved holder for holding dinner and other plates and dishes, and for other like purposes.

1764. W. E. Newton, 66, Chancery-lane—An imp. in elongated bullets. (A com.)

Dated 14th June, 1862.

1768. T. Williams, 14, Red Lion-street, Clerkenwell, and H. Cox, 22, Lower-street, Islington—Imp. in churns, partly applicable to washing machines.
1770. J. G. A. Dallot, L'Isle Adam, France—A new portable circular saw.
1772. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in Jacquard machines. (A com.)
1774. R. A. Brooman, 166, Fleet-street—Imp. in coking ovens, in collecting and utilising the products resulting from the distillation or carbonisation of coal and other matters producing coke, and in the apparatus employed therein. (A com.)
1776. R. Hicks, Kensington-park-terrace—Imp. in the manufacture or preparation of paints, pigments, and colours.

Dated 16th June, 1862.

1780. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in the construction of presses for extracting liquids from various substances. (A com.)
1782. W. J. Curtis, Tufnell-park-road, Holloway—An imp. in the construction of screw propellers.

Dated 17th June, 1862.

1784. J. E. Holmes, South Parade, Trafalgar-square, Chelsea—Improved machinery for digging or cultivating land. (A com.)
1790. J. Nield and T. A. Nield, Dukinfield, Cheshire—Imp. in moulding or manufacturing pipes, columns, or other similar articles of cast iron or other metals.
1794. W. Clark, 53, Chancery-lane—Imp. in the manufacture of buttons, and in apparatus for the same. (A com.)

Dated 18th June, 1862.

1798. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in projectiles. (A com.)
1800. F. Colman, Normanton, Yorkshire—Imp. in apparatus for discharging coals, minerals, or other substances.

Dated 19th June, 1862.

1804. G. Speight, 5, St. John-street-road—An imp. in the manufacture of head ornaments.
1808. R. Stansfield and J. Dodgeon, Todmorden, Lancashire—Imp. in looms for weaving.
1810. M. Wiggell, Strand, Topham, Devonshire—Imp. in the form of bolts and other fastenings for shipbuilding and other purposes.
1812. J. B. Wood, Vernon-house, Camp-street, Broughton, near Manchester—Imp. in the manufacture of driving straps or bands, the backs of wire cards, and cop tubes.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

1839. G. T. Bousfield, Loughborough-park, Brixton—Certain new and useful imp. in steam engine valves. (A com.)—21st June, 1862.
1845. G. Haseltine, 100, Fleet-street—Imp. in machinery for mowing and reaping, the driving gear employed being applicable to machines for other purposes. (A com.)—23rd June, 1862.

PATENTS SEALED.

[From Gazette, June 27th, 1862.]

- | | |
|--------------------------------|--|
| June 27th. | 20. W. A. Fell. |
| 3264. N. McHaffie. | 22. G. Jeffries. |
| 3275. R. A. Brooman. | 27. W. E. Gedge. |
| 3276. A. Edward and J. Edward. | 71. J. Carter. |
| 2. N. C. Szerelmey. | 89. T. Gilbert, C. Gilbert, and T. Haddon. |
| 5. J. Walker. | 131. T. Emmott and J. Travis. |
| 6. T. C. Clarke. | 141. L. Barrat. |
| 8. R. A. Brooman. | 239. W. E. Newton. |
| 11. B. Rhodes. | 689. E. T. Hughes. |
| 13. W. B. Patrick. | |
| 14. E. F. Davis. | |

[From Gazette July 1st, 1862.]

June 30th.

25. G. Stracey.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, July 1st, 1862.]

- | | |
|--------------------------------|-----------------------------------|
| June 23rd. | June 26th. |
| 1520. G. Redrup. | 1533. G. Wrigley & T. H. Wrigley. |
| 1524. T. Howard. | 1535. B. Burton. |
| 1538. G. Dawes and C. J. Carr. | 1546. T. Wight. |
| 1540. A. V. Newton. | 1552. G. Baker. |
| | 1559. T. Bell. |
| June 25th. | 1562. J. A. Wilkinson. |
| 1541. J. M. J. Baillie. | June 27th. |
| 1557. R. A. Brooman. | 1656. W. A. Munn. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, July 1st, 1862.]

- | | |
|-------------------------|----------------------------------|
| June 19th. | June 25th. |
| 1274. G. Green. | 1456. F. Leiss and C. Schneider. |
| June 23rd. | |
| 1445. I. J. Silbermann. | |

Journal of the Society of Arts.

FRIDAY, JULY 11, 1862.

INTERNATIONAL EXHIBITION OF 1862.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate of £452,100, have been attached to the Deed.

SEASON TICKETS.

Season Tickets may be obtained at the Society's House, on application to Mr. S. T. Davenport, Financial Officer. The prices of the tickets are as follows:—£2 10s., admitting to the International Exhibition and the Gardens of the Royal Horticultural Society every day during the remainder of the season; £1 10s., admitting to the Exhibition only, every day; and 10s., admitting to the Exhibition on shilling days only.

CONVERSAZIONI.

The second Conversazione of the present season took place on Wednesday evening, the 9th inst., at the South Kensington Museum. There were upwards of 4,500 persons present.

His Royal Highness the Grand Duke of Saxe Weimar, His Serene Highness and Her Royal Highness Prince and Princess Hermann of Saxe Weimar, their Serene Highnesses Prince and Princess Edward of Saxe Weimar, His Serene Highness the Prince of Lichtenstein, and His Serene Highness Prince George of Solens-Braunfels, honoured the Society with their presence.

The First Choir of the National Choral Society, under the direction of Mr. G. W. Martin, performed a Selection of Part-Songs, Glees, &c., and Distin's Ventil Horn Union played a Selection of Music.

The third Conversazione of the season will take place on Wednesday, the 8th October.

CENTRAL COMMITTEE OF EDUCATIONAL UNIONS IN CONNEXION WITH THE SOCIETY OF ARTS.

MEMBERS OF THE COMMITTEE.

EDWIN ADAMS, Esq., M.R.C.P., Chelmsford Local Educational Board.

The Rev. THOMAS BACON and the Hon. and Rev. S. BEST, Honorary Secretaries of the Southern Counties Adult Educational Society.

BARNETT BLAKE, Esq., Agent of the Yorkshire Union of Mechanics' Institutes.

HARRY CHESTER, Esq., Vice-President of the Society of Arts.

The Rev. SAMUEL CLARK, Chairman of the Central Board of Examiners of the Society of Arts.

The Rev. C. D. GOLDIE, Member of the Committee of the Bucks and Berks Adult Education Society.

The Hon. and Rev. GODOLPHIN HASTINGS, M.A., Vice-Chairman of the Hertford Local Educational Board.

The Rev. DAVID MELVILLE, Member of Council, JOHN SLANEY PAKINGTON, Esq., President of the Worcestershire Union of Educational Institutions.

WM. NEWMARCH, Esq., Notting-hill Working Men's Association.

SIR THOMAS PHILLIPS, F.G.S., Chairman of the Council, and SAMUEL REDGRAVE, Esq., Treasurer of the Society of Arts.

M. H. MARSH, Esq., M.P., Vice-President of the Society of Arts.

BARROW RULE, Esq., M.R.C.P., Aldershot District Local Educational Board.

F. TALBOT, Esq., South Staffordshire Union of Educational Institutions.

JOHN JONES, Esq., Secretary and Organizing Master to the South Staffordshire Union of Educational Institutions.

I. The Central Committee consists of two representatives of each Provincial and District Union and Adult Educational Society, four members of the Council of the Society of Arts, the Chairman of the Society's Central Board of Examiners, and six representatives of Local Educational Boards.

II. The object of the Central Committee is to promote uniformity of action and a fixed standard in the Elementary Examinations held by the various bodies in connexion with the Society of Arts.

III. The Central Committee provides for common use a scheme of two Elementary Examinations, consisting of two sets of papers, one suited for junior, the other for senior candidates, with corresponding Forms of Certificate, to be awarded by the local authority under which the Examination has been conducted.

IV. The certificate of a Senior Candidate, of sixteen years of age, will be received, without any further "Previous Examination," as a "pass" to the Final Examinations of the Society of Arts, if accompanied by a certificate from the Local Board or Union, that the candidate is fit to be examined in the special subject or subjects in the Society of Arts Programme in which he or she proposes to be examined.

V. The Society of Arts prints and distributes, at cost price, the Examination Papers, Certificates, and Circulars, and provides for the correspondence of the Central Committee.

VI. The Elementary Examinations are not intended to be in any degree competitive. They are open to persons of either sex and of any age.

VII. To prevent the possibility of unfair advantages being taken from a premature knowledge of the Examination Papers, the Examinations must be simultaneous everywhere.

VIII. In 1863 they will be held on Tuesday, the 3rd, Wednesday the 4th, Thursday the 5th, and Friday the 6th of March, after 4 o'clock p.m.

IX. In any case in which a Local Examining Body may examine candidates in the doctrines of Holy Scripture, in the Prayer Book, or in any other religious formulary, the results of such Examination may be stated, by that local Examining Body, on the certificate; though the Central Committee, representing a variety of opinions, does not itself provide for Examinations in religious doctrine.

X. The Secretary of each Union, Society, or Board, which desires to use the Examination Papers of the Central Committee, must apply for the requisite forms on or before the 2nd February, 1863, to "The Secretary, Cen-

tral Committee for Elementary Examinations, Society of Arts, John-street, Adelphi, London, W.C."

SCHEME OF THE EXAMINATIONS FOR 1863.

JUNIOR CANDIDATES.

1. Every candidate must be examined in the first four rules of Arithmetic, simple and compound, and in any two of the three following subjects:—

- A. A general knowledge of the Gospel History.
- B. The rudiments of English History.
- C. The rudiments of the Geography of England.

2. Female candidates must also be examined in plain needle-work.

3. Fair writing and spelling, with good reading of a simple narrative, will be required of every candidate.

4. A satisfactory examination will entitle the candidate to a certificate.

SENIOR CANDIDATES.

1. Every Candidate must be examined in arithmetic, including the Rule of Three, Decimal and Vulgar Fractions, and in any two of the three following subjects:—

- A. The facts of St. Mark's Gospel and the Acts of the Apostles.
- B. English History from the accession of James the First to the death of Anne, with the rudiments of the history from the Conquest.
- C. Geography of the British Isles.

2. Every female candidate must show proficiency in needle-work.

3. All candidates will be required to exhibit in their papers a fairly good handwriting, spelling, and knowledge of grammar.

4. A satisfactory examination will entitle the candidate to a certificate.

By order,

P. LE NEVE FOSTER,

Secretary to the Central Committee.

Society of Arts, John-street, Adelphi,
London, W.C., July, 1862.

ON THE PROPERTIES OF IRON, AND ITS RESISTANCE TO PROJECTILES AT HIGH VELOCITIES.

By WILLIAM FAIRBAIRN, F.R.S.

The following is the substance of a paper recently delivered before the Royal Institution:—

We have no correct record as to the exact time when wrought-iron plates were first employed for the purpose of building vessels. It is, however, certain that iron barges were in use on canals at the close of the last century. In 1824, Mr. Manley, of Staffordshire, built an iron steam-boat for the navigation of the river Seine, and this was the first iron vessel that attempted a sea voyage. She was navigated from this country to Havre, by the late Admiral Sir Charles Napier, and although constructed for shallow rivers, she nevertheless crossed the channel in perfect safety. From that time to 1830 no attempt was made to build iron vessels, and nothing was done towards ascertaining the properties of iron as a material for ship-building.

A series of experiments, instituted by the Forth and Clyde Canal Company in 1829-30, to ascertain the law of traction of light boats at high velocities on canals, led to the application of iron for the construction of vessels; and the lightness of these new vessels, combined with their increased strength, suggested the extended application of the material in the construction of vessels of much larger dimensions, and ultimately to those of the largest class, both in the war and mercantile navy. Considerable difficulty, however, existed with regard to the navy; and although the principle of iron construction as applied to merchant vessels and packets was fully established, it was nevertheless considered inapplicable, until of late years,

for ships of war. It is true that until the new system of casing the sides of vessels, first introduced by the Emperor of the French, in 1854, was established, the iron ship was even more dangerous under fire than one built entirely of wood. Now, however, that thick iron plates are found sufficiently strong, under ordinary circumstances, to resist the action of guns not exceeding 120-pounders, for a considerable length of time, the state of the navy and the minds of our naval officers have entirely changed. We must, therefore, now look to new conditions, new materials, and an entirely new construction, if we are to retain our superiority as *mistress of the seas*. There yet remain amongst us those who contend for the wooden walls, but they are no longer applicable to the wants of the state; and I am clearly of opinion that we cannot afford to trifle with so important a branch of the public service as to fall behind any nation, however powerful and efficient they may be in naval construction. Having satisfied ourselves that this desideratum must be attained, at whatever cost, I shall now endeavour to point out such facts as in my opinion relate to the changes that are now before us, and simply endeavour to show—

1st. The description of iron best calculated to secure strength and durability in the construction of ships of war.

2nd. The distribution and best forms of construction to attain this object; and,

Lastly. The properties of iron best calculated to resist the penetration of shot at high velocities.

Properties of Iron.—If we are desirous to attain perfection in mechanical, architectural, or ship-building construction, it is essential that the engineer or architect should make himself thoroughly acquainted with the properties of the materials which he employs. It is unimportant whether the construction be a house, a ship, or a bridge. We must possess correct ideas of the strength, proportion, and combination of the parts, before we can arrive at satisfactory results; and to effect these objects the naval architect should be conversant with the following facts relating to the resisting powers of malleable and rolled iron to a tensile strain.

The resistance in tons per square inch of—

Yorkshire Iron is	24.50 tons
Derbyshire	20.25 "
Shropshire	22.50 "
Staffordshire	20.00 "

Strength of Rivetted Joints.—The architect having fortified himself with the above facts, will be better able to carry out a judicious distribution of the frames, ribs, and plates of an iron ship, so as to meet the various strains to which it may be subjected, and ultimately to arrive at a distribution where the whole in combination presents uniformity of resistance to repeated strains, and the various changes it has to encounter in actual service.

There is, however, another circumstance, of deep importance to the naval architect, which should on no account be lost sight of, and that is, the comparative values of the rivetted joints of plates to the plates themselves. These, according to experiment, give the following results:—

Taking the cohesive strength of the plate at...100	
The strength of the double-rivetted joint was found to be	70
And the single rivetted joint.....	56

These proportions apply with great force to vessels requiring close rivetting, such as ships and boilers that must be water-tight, and in calculation it is necessary to make allowances in that ratio.

Strength of Ships.—Of late years it has been found convenient to increase the length of steamers and sailing vessels to as much as eight or nine times their breadth of beam, and this for two reasons; first, to obtain an increase of speed by giving fine sharp lines to the bow and stern; and second, to secure an increase of capacity for the same midship section, by which the carrying powers of the ship

are greatly augmented. Now, there is no serious objection to this increase of length, which may or may not have reached the maximum. But, unfortunately, it has hitherto been accomplished at a great sacrifice to the strength of the ship. Vessels floating on water and subjected to the swell of a rolling sea—to say nothing of their being stranded or beaten upon the rocks or sandbanks of a lee shore—are governed by the same laws of transverse strain as simple hollow beams, like the tubes of the Conway and Britannia tubular bridges. Assuming this to be true—and indeed it scarcely requires demonstration—it follows that we cannot lengthen a ship with impunity without adding to her depth or to the sectional area of the plates in the middle along the line of the upper deck.

If we take a vessel of the ordinary construction, or what some years ago was considered the best—300 feet long, 41 feet 6 inches beam, and 26 feet 6 inches deep—we shall be able to show how inadequately she is designed to resist the strains to which she would be subjected. To arrive at these facts we shall approximate nearly to the truth by treating it as a simple beam; and this is actually the case, to some extent, when a vessel is supported at each end by two waves, or when rising on the crest of another, supported at the centre with the stem and stern partially suspended. Now in these positions the ship undergoes, alternately, a strain of compression and of tension along the whole section of the deck, corresponding with equal strains of tension and compression along the section of the keel, the strains being reversed according as the vessel is supported at the ends or the centre. These are, in fact, the alternate strains to which every long vessel is exposed, particularly in seas where the distance between the crests of the waves does not exceed the length of the ship.

It is true that a vessel may continue for a number of voyages to resist the continuous strains to which she is subjected whilst resting on water; but supposing in stress of weather, or from some other cause, she is driven on rocks, with her bow and stern suspended, the probability is that she would break in two, separating from the insufficiency of the deck on the one hand, and the weakness of the hull on the other. This is the great source of weakness in wrought-iron vessels of this construction, as well as of wooden ones, when placed in similar trying circumstances.*

Changes in Progress.—Having directed attention to the strength of ships, and the necessity for their improved construction, we may now advert to the changes by which we are surrounded and to the revolution now pending over the destinies of the navy, and the deadly weapons now forging for its destruction. It is not for us alone, but for all other maritime nations, that these Cyclopean monsters are now issuing from the furnaces of Vulcan; and it behoves all those exposed to such merciless enemies to be upon their guard, and to have their *Warriors*, *Merrimacs*, and *Monitors* ever ready, clothed in mail from stem to stern, to encounter such formidable foes. It has been seen, and every experiment exemplifies the same fact, that the iron ship with its coat of armour is a totally different construction to that of the wooden walls which for centuries have been the pride and glory of the country. Three-deckers, like the *Victory* and the *Ville de Paris* of the last century, would not exist an hour against the sea-monsters now coming into use.

The days of our wooden walls are therefore gone; and instead of the gallant bearing of a 100-gun ship, with every inch of canvas set, dashing the spray from her bows and careering merrily over the ocean, we shall find in its place a black demon, some five or six hundred feet long, stealing along, with a black funnel and flag-staff, on her mission of destruction, and scarcely seen above water, excepting only to show a row of teeth on each side, as formidable as the immense iron carcass that is floating below.

This may, with our present impressions, be considered a perspective of the future navy of England—probably not encouraging—but one on which the security of the country may ultimately have to depend, and to the construction of which the whole power and skill of the nation should be directed. I have noticed these changes, which are fast approaching, from the conviction that the progress of the applied sciences is not only revolutionizing our habits in the development of naval constructions, as in every other branch of industry, but the art of war is undergoing the same changes as those which have done so much for the industrial resources of the country in times of peace. It is therefore necessary to prepare for the changes now in progress, and endeavour to effect them on principles calculated, not only to ensure security, but to place this country at the head of constructive art. It is to attain these objects that a long and laborious class of experiments have been undertaken by the Government, to determine how the future navy of England shall be built, how it should be armed, and under what conditions it can best maintain the supremacy of the seas. This question does not exclusively confine itself to armour-plated vessels, but also to the construction of ships which, in every case, should be strong and powerful enough to contend against either winds and waves or to battle with the enemy. It is for these reasons that I have ventured to direct attention to the strength of vessels, and to show that some of our mercantile ships are exceedingly weak, arising probably from causes of a mistaken economy on the one hand, or a deficiency of knowledge or neglect of first principles on the other.

Now, it is evident that our future ships of war of the first class must be long and shallow; moreover, they must contain elements of strength and powers of resistance that do not enter into the construction of vessels that are shorter and nearly double the depth. If we take a first-rate ship of the present construction, such as the *Duke of Wellington*, and compare it with one of the new or forthcoming construction, carrying the same weight of ordnance, we should require a vessel nearly twice the length and little more than half her depth. Let us, for example, suppose the *Duke of Wellington* to be 360 feet long and 60 feet deep, and the new construction 500 feet long and 46 feet deep; we should then have for the resistance of the *Duke of Wellington* to a transverse strain tending to break her back:

$$W = \frac{a d c}{l}$$

Taking 60 as the constant, and the area of the bottom and upper deck as 1060 square inches, we have

$$W = \frac{1060 \times 60 \times 60}{340} = 12,223 \text{ tons}$$

as the weight that would break her in the middle. Let us now take the new ship, and give her the same area top and bottom, and again we have

$$W = \frac{1060 + 46 \times 60}{500} = 5851 \text{ tons,}$$

which is less than half the strength. From this it is obvious—if we are correct in our calculations—that the utmost care and attention is requisite in design and construction to ensure stability and perfect security in the build of ships.

Mechanical Properties of Iron.—It is unnecessary to give more examples in regard to strength, and the proportions that should be observed in the construction of our future navy. I have simply directed attention to it as a subject of great importance, and one that I am satisfied will receive careful consideration on the part of the Admiralty and the Comptroller of the Navy.

The next question for consideration is, the properties of iron best calculated to resist the penetration of shot at high velocities, and in this I am fortunate in having before me

* See Vol. I. of the "Transactions of the Institution of Naval Architects," on the Strength of Iron Ships.

the experiments of the Committee on Iron Plates, which may be enumerated as under:—

Specific Gravity.	Tensile Strength in Tons per Square Inch.	Compression per Unit of Length in Tons.	Statical Resistance to Punching in Tons; 1-inch Plate.
7.7621	24.802	14.203	40.1804

Remarks.—The specimens subjected to compression gradually squeezed down to one-half their original height, increasing at the same time in diameter till they attained 90 tons on the square inch.

In these experiments, four descriptions of iron were selected, marked A, B, C, D; the two first and last were taken from rolled and hammered iron plates, excepting C, which was homogeneous, and gave higher results to tension and dead pressure than the others.

In destiny and tenacity they stood as follows:—

Mark on Plates.	Density.	Tenacity in Tons.
A Plates	7.8083	24.644
B Plates	7.7035	23.354
C Plates, homogeneous ...	7.9042	27.032
D Plates	7.6322	24.171

Here it will be observed, that the strengths are in the ratio of the densities, excepting only the B plates, which deviate from that law.

On the resistance to compression, it will be seen that in none of the experiments was the specimen actually crushed; but they evidently gave way at a pressure of 13 tons per square inch, and were considerably cracked and reduced in height by increased pressure.

From the experiments on punching, we derive the resistance of A, B, C, D plates to a flat-ended instrument forced through the plate by dead pressure as follows:—

Mark on Plates.	Shearing Strain in Tons per Square Inch.	Ratio, taking A as Unity.
A Plates	19.511	1.000
B Plates	17.719	0.907
C Plates	27.704	1.168
D Plates	17.035	0.873

Here may be noticed, that the difference between the steel plates of series C, and the iron plates of series A, is not considerable, though in all others the steel plates exhibit a superiority in statical resistance.

Having ascertained, by direct experiment, the mechanical resistance of different kinds of iron and steel plates to forces tending to rupture, it is interesting to observe the close relation which exists between not only the chemical analysis as obtained by Dr. Percy, but how nearly they approximate to the force of impact, as exhibited in the experiments with ordnance at Shoeburyness.

Dr. Percy, in his analysis, observes that of all the plates tested at Shoeburyness, none have been found to resist better than those lettered A, B, C, D, with the exception of C. The iron of plate E contained less phosphorus than either of the three, A, B, D; and it is clearly established that phosphorus is an impurity which tends in a remarkable degree to render the metal "cold short," *i.e.*, brittle when cold.

The following table shows the chemical composition of these irons:—

Mark.	Carbon.	Sulphur.	Phosphorus.	Silicon.	Manganese.
A	0.01636	0.104	0.106	0.122	0.28
B	0.0327	0.121	0.173	0.160	0.029
C	0.023	0.190	0.020	0.014	0.100
D	0.0436	0.118	0.228	0.174	0.250
E	0.170	0.0577	0.0894	0.110	0.330

Comparing the chemical analysis with the mechanical properties of the irons experimented upon, we find that the presence of 0.23 per cent. of carbon causes brittleness in the iron; and this was found to be the case in the homogeneous iron plates marked C; and although it was found equal to A plates in its resistance to tension and compression, it was very inferior to the others in resisting concussion or the force of impact. It therefore follows that toughness combined with tenacity is the description of iron plate best adapted to resist shot at high velocities. It is also found that wrought-iron, which exhibits a fibrous fracture when broken by bending, presents a widely different aspect when suddenly snapped asunder by vibration, or by a sharp blow from a shot. In the former case the fibre is elongated by bending, and becomes developed in the shape of threads as fine as silk, whilst in the latter the fibres are broken short, and exhibit a decidedly crystalline fracture. But, in fact, every description of iron is crystalline in the first instance; and these crystals, by every succeeding process of hammering, rolling, &c., become elongated, and resolve themselves into fibres. There is, therefore, a wide difference in the appearance of the fracture of iron when broken by tearing and bending, and when broken by impact, where time is not an element in the force producing rupture.

If we examine with ordinary care the state of our iron manufacture as it existed half a century ago, we shall find that our knowledge of its properties was of a very crude and most imperfect character. We have yet much to learn, but the necessities arising from our position as a nation and the changes by which we are surrounded, will stimulate our exertions to the acquisition of knowledge and the application of science to a more extended investigation of a material destined, in course of time, to become the bulwark of the nation. It is, therefore, of primary importance, that we should make ourselves thoroughly acquainted not only with the mechanical and chemical properties of iron, but that we should moreover be able to apply it in such forms and conditions as are best calculated to meet the requirements of the age in which we live.

Entertaining these views, I cheerfully commenced with my talented colleagues the laborious investigations in which we are now engaged; and looking at the results of the recent experiment with the 300-pounder gun on the one hand, and the resting targets on the other, there is every prospect of an arduous and long-continued contest.

From the Manchester experiments, to which I have alluded, we find that with plates of different thicknesses, the resistance varies directly as the thickness, that is, if the thickness be as the numbers 1, 2, 3, &c., the resistance will be as 1, 2, 3, &c.; but those obtained by impact at Shoeburyness show that, up to a certain thickness of plate, the resistance to projectiles increases nearly as the square of the thickness. That is, if the thickness be as the numbers 1, 2, 3, 4, &c., the resistance will be as the numbers 1, 4, 9, 16, &c., respectively. The measure therefore of the absolute destructive power of shot is its *vis viva*, not its momentum, as has been sometimes supposed, but the work accumulated in it varies directly as the weight of the shot multiplied into the square of the velocity.

There is therefore a great difference between statica pressure and dynamical effect; and in order to ascertain the difference between flat-ended and round-ended shot, a series of experiments were undertaken with an instrument or punch exactly similar in size and diameter and precisely corresponding with the steel shot of the piece .85 diameter employed in the experiments at Shoeburyness. The results on the A, B, C, and D plates are as follows. (See next page.)

These figures show that the statical resistance to punching is about the same, whether the punch be flat-ended or round-ended, the mean being in the ratio of 1,000 : 1,085 or $8\frac{1}{2}$ per cent. greater in the round-ended punch. It is, however, widely different when we consider the depth of indentation of the flat-ended punch, and compare it with that produced by the round-ended one,

Character of Plates.		Resistance in lbs.	
		Punch flat-ended.	Punch Round-ended.
Half-inch thick	A Plates ...	57,956	61,886
	B Plates ...	57,060	48,788
	C Plates ...	71,035	85,524
	D Plates ...	46,080	43,337
Three-quarter-inch thick ...	B Plates ...	84,587	98,420
	D Plates ...	82,381	98,571
Mean.....		67,017	72,754

which is $3\frac{1}{2}$ times greater. Hence we derive this remarkable deduction, that whilst the statical resistance of plates to punching is nearly the same, whatever may be the form of the punch, yet the dynamic resistance or work done in punching is twice as great with a round-ended punch as with a flat-ended one. This of course only approximately expresses the true law; but it exhibits a remarkable coincidence with the results obtained by ordnance at Shoeburyness, and explains the difference which has been observed in these experiments, more particularly in those instances where round shot was discharged from smooth-bored guns at high velocities. To show more clearly the dynamic effect or work done by the weight of shot which struck some of the targets at different velocities, the following results have been obtained:—

TARGET.	Weight of Shot striking Target.	Work done on Target.	
		Total.	Per Square Foot.
		Foot lbs.	Foot lbs.
Thornycroft 8-inch Shield . . .	1253	—	29,078,000
Thornycroft 10-in. Embrasure	1511	—	37,140,000
Roberts's Target	946	822,000	19,726,000
Fairbairn's Target	1024	324,000	23,311,000
Warrior Target	3229	312,000	62,570,000
The Committee's Target . . .	6410	—	124,098,780

From the above, it will be observed, that the two last targets have sustained in work done what would, if concentrated, be sufficient to sink the largest vessel in the British navy.

We are all acquainted with the appearances and physical character of artillery, but few are conversant with the nature of the operations and the effects produced by shot on the sides of a ship or on resisting forts and targets.

The shot of a gun—to use the expression of my colleague, Mr. Pole—is simply the means of transferring mechanical power from one place to another. The gunpowder in the gun develops by its combustion a certain quantity of mechanical force, or work as it is now called, and the object of the shot is to convey this work to a distance, and apply it to an object supposed to be otherwise inaccessible. The effect of this, according to Mr. Pole's formula, is—

W = its velocity in feet per second.

V = weight of the shot in lbs.

Then, by the principle of *vis viva*, the quantity of work stored up by the moving mass, measured in lbs. one foot high, is—

$$\frac{W V^2}{2g}$$

g being the force of gravity = $32\frac{1}{2}$.

Thus, if we have a shot, like that recently used against the *Warrior* target, 156 lbs., moving at the rate of 1,700 feet per second, the work done will be—

$$\frac{156 + (1,700)^2}{64\frac{1}{2}} = 7,008,238 \text{ one foot high.}$$

Showing at once the immense power that this small body is able to deliver on every resisting medium tending to arrest its course and bring its particles to a state of rest. Or, in other words, it is equivalent to raising upwards of 3,000 tons a foot high in the air.

The Application of Iron for Purposes of Defence.—Having examined, in a very condensed and cursory manner, the present state of our knowledge in regard to iron, and its application to the purposes of shipbuilding, let us now consider in what form and under what circumstances it can best be applied for the security of our vessels and forts. To the latter the answer is, Make the battery shields thick enough: but a very different solution is required for the navy, where the weight and thickness of the plates is limited to the carrying powers of the ship. It has been observed with some truth that we have learnt a lesson from the recent naval action on the American waters; but it must be borne in mind that neither of the vessels engaged nor the ordnance employed were at all comparable to what have been used at Shoeburyness.

To those who, like myself, have gone through the whole series of experiments, the late engagement will appear instructive, but not calculated to cause any great alarm, nor yet effect any other changes than those primarily contemplated by the Government, and such as have been deduced from our own experiments. It is, nevertheless, quite evident that our future navy *must be entirely of iron*; and, judging from the last experiment with the Armstrong smooth-bore gun, it would almost appear as a problem yet to be solved, whether our ships of war are not as safe without iron armour as with it. If our new construction of ships are strong enough to carry armaments of 300-pounder guns, which is assumed to be the case, our plating of 6 or 7 inches thick would be penetrated, and probably become more destructive to those on board than if left to make a free passage through the ship. In this case we should be exactly in the same position as we were in former days with the wooden walls; but with this difference, that if built of iron the ship would not take fire and might be made shell proof. It is, however, very different with forts, where weight is not a consideration, and those I am persuaded may be made sufficiently strong to resist the heaviest ordnance that can be brought to bear against them. In this statement I do not mean to say that ships of war should not be protected; but we have yet to learn in what form this protection can be effected to resist the last powerful ordnance, and others of still greater force which are *looming in the distance*, and are sure to follow.

A great outcry has been raised about the inutility of forts; and the Government, in compliance with the general wish, has suspended those at Spithead: I think improperly so; as the recent experiments at Shoeburyness clearly demonstrate that no vessel, however well protected by armour-plates, could resist the effects of such powerful artillery; and instead of the contest between the *Merrimac* and the *Monitor*, and that of the 300-pounder gun being against, they are to every appearance in favour of forts. Should this be correct, we have now to consider how we are to meet and how resist the smashing force of such powerful ordnance as was levelled against the 'Warrior' target.

During the whole of the experiments at Shoeburyness I have most intently watched the effects of shot on iron plates. Every description of form and quality of iron has been tried, and the results are still far from satisfactory; and this is the more apparent since the introduction of the large 300-pounder, just at a time when our previous experiments were fairly on the balance with the 40, 68, 100, and 126-pounders. They now appear worthless, and nothing is left but to begin our labours again *de novo*.

It has been a question of great importance, after having determined the law of resistance and the requisite quality of the iron to be used as armour-plates, how these plates should be supported and attached to the sides of the ship. Great difference of opinion continues to exist on this

subject,—some are for entirely dispensing with wood; probably the greater number contend for a wood backing, the same as the *Warrior* and the *Black Prince*. I confess myself in the minority on this question; and, judging from the experiments, I am inclined to believe from past experience that wood combined with iron is inferior to iron and iron in its power of resistance to shot; and I am fully persuaded that ultimately the iron armour-plates must be firmly attached to the side, technically called the skin, of the ship. It must, moreover, form part of the ship itself, and be so arranged and jointed as to give security and stability to the structure.

The experiments instituted by the Committee on Iron Plates have been well considered and carefully conducted: they commenced with a series of plates selected from different makers, of varying thicknesses, and these have been tested both as respects quality and their powers of resistance to shot. They have, moreover, been placed at different angles and in a variety of positions, and we had just arrived at the desired point of security, when the thundering 300-pounder smooth bore upset our calculations and levelled the whole fabric with the ground. We are, however, not yet defeated; and true to the national character, we shall, like the knights of old, resist to the last—

“And though our legs are smitten off,
We'll fight upon our stumps.”

And thus it will be with the Iron Committee and the Armstrong and the Whitworth guns.

In conclusion, allow me to direct attention to a drawing of the ‘Warrior’ target, with wood backing and its compeer entirely of iron. The first underwent a severe battering, previous to the attack from the 300-pounder, but the other sustained still greater, with less injury to the plates, notwithstanding the failure of the bolts in the first experiment. It must, however, be admitted that plates on wood backing have certain advantages in softening the blow, but this is done at the expense of the plate, which is much more deflected and driven into the wood, which, from its compressibility, presents a feeble support to the force of impact. Again, with wood intervening between the ship and the iron plates, it is impossible to unite them with long bolts so as to impart additional strength to it; on the contrary, they hang as a dead weight on her sides with a constant tendency to tear her to pieces. Now, with iron on iron we arrive at very different and superior results. In the latter, the armour-plates, if properly applied, will constitute the strength and safety of the structure; and, notwithstanding the increased vibration arising from the force of impact of heavy shot, we are more secure in the invulnerability of the plates and the superior resistance which they present to the attack of the enemy's guns. In these remarks I must not, however, attempt to defend iron constructions where they are not defensible, and I am bound to state that in constructions exclusively of iron there is a source of danger which it is only fair to notice, and that is, that the result of two or more heavy shot, or a well concentrated fire, might not only penetrate the plates but break the ribs of the ship. This occurred in the last experiment on my own target, where a salvo of six guns concentrated four on one spot, not more than 14 inches diameter, went through the plates and carried away a part of the frame behind. The same effect might have taken place on the ‘Warrior’ target; and certainly 9 inches of wood is of little value when assailed by a powerful battery of heavy ordnance and a well concentrated fire.*

* Since the above was written, another experiment has been made on the ‘Warrior’ target with the 300-pounder smooth-bore gun. From this it appears that the wood backing between the armour plates and the skin of the ship cannot safely be dispensed with, and that some compressible or softer substance than iron and iron is necessary to deaden the blow, and absorb the fragments of the shot and the broken plates, which in this instance lodged in the wood, and did not perforate, but only

In closing these remarks, I have every confidence that the skill and energy of this country will keep us in advance of all competitors, and that a few more years will exhibit to the world the Iron Navy of England, as of old, with its Wooden Walls, unconquerable on every sea.

SUBJECTS FOR DISCUSSION CLASSES IN INSTITUTIONS.

The following list has been prepared, partly from returns forwarded by the Institutions in Union with the Society, and partly from various other sources. It is published in the hope that it may be useful to the managers of Discussion Classes, in suggesting suitable subjects for discussion.

HISTORY.

Did St. Paul ever visit Great Britain?
Which was the greater warrior—Alexander the Great or Julius Caesar?

Ancient and modern greatness.
Which contributed most to the success of the Mahometans, the decline of the Martial Spirit among Eastern nations, or the enthusiasm inspired by the creed of Mahomet?

Was Mahomet an Impostor?
St. Gregory the Great—the Popedom of the 6th century.

Which monarch did more in his reign for the advancement of civilisation, Alfred the Great or William the Conqueror?

Which did the more good to his country, Charlemagne or Alfred the Great?

Had William the Conqueror any right to the British Throne?

Did the Norman Conquest prove beneficial to England or not?

Were the Crusades beneficial to Mankind?
Had Bruce or Balliol the better claim to the Throne of Scotland?

Was Wallace or Tell the greater Patriot?
Was Edward I. justifiable in taking the life of Wallace?

Were the Wars of the Roses justifiable?
Which had the greater right to the Crown of England, the House of York or the House of Lancaster?

Was Joan of Arc an impostor?
Was Wat Tyler's insurrection justifiable?

Was the secularization of the revenues gained by suppressing the Monasteries under Henry VIII. a wanton violation of the rights of property?

Which was the greater man, Cardinal Ximenes or Cardinal Wolsey?

The reign of Mary I. retarded the Reformation for a season. Was that delay productive of good or evil?

Was Queen Elizabeth justified in executing Mary Queen of Scots?

Is the character of Queen Elizabeth worthy of admiration?

Was Sir Walter Raleigh justly executed?
The character of Lord Bacon.

Was the execution of Lord Strafford justifiable?
The policy of the Stuarts.

cracked, the skin of the target. From this fact it cannot be denied that this experiment is more satisfactory than those on the iron on iron targets; and however desirable it may be to realize a more effective construction as regards the strength of the ship, it cannot be doubted in so far as the security of the ship and the lives of those on board are concerned, that a vessel with wood backing is safer in action than one composed entirely of iron. In the present state of our knowledge the experiments are therefore against iron and iron, as regards security from the effects of shot, but they are unfavourable as respects the strength of the ship.

Were the long Parliament justified in declaring War against Charles the First?

Did circumstances justify the Execution of Charles I.?

Was Cromwell justified in the massacre of Drogheda?

The Character of Cromwell as warrior, statesman, and man.

Is Cromwell justly charged with hypocrisy?

Is a debt of Gratitude due to General Monk for restoring Royalty?

Was the expulsion of James II. justifiable or not?

Was the character of the Duke of Marlborough to be admired?

Has the union of Scotland with England proved beneficial to the former country?

Which best merited the title of "Great," Henry IV. or Louis XIV.?

Which did the most to produce the French Revolution, the tyranny of the Government, the excesses of the higher orders, or the writings of Voltaire, Montesquieu, and Rousseau?

Did the first French Revolution produce a beneficial influence on Europe?

Was the Execution of Louis XVI. an act of justice?

Was Charles Edward justly called the Pretender?

Were the United States in America justified in revolting?

Did England suffer or gain by losing America?

Was Admiral Byng justly executed?

Clive and Hastings compared.

Was Warren Hastings' Rule in India such as merited the opprobrium cast upon him by Burke and his supporters?

Was Fox or Pitt the greater Man?

Was the English Government justified in transporting Napoleon to St. Helena?

Which has produced most great men—the last half of the 17th or the first half of the 18th century?

Are the Dark Ages deserving the ignominy usually cast upon them?

Is the charge of Extravagance in Dress as applicable to the present as to past ages?

Have England's Conquerors or her Conquests most conduced to her greatness?

Was the expulsion of the Moors from Spain unfavourable to civilisation?

Was the partition of Poland justifiable?

Excellence in the Fine Arts is not evidence of the Decline of a State.

Is Macaulay's "History of England" deficient in many of the characteristics of a good history?

Do we, or did our ancestors of the "good old time," enjoy a greater amount of social happiness?

Has moral progress in England kept pace with the increase of material wealth?

Does commercial prosperity strengthen or effeminate a country?

Is the ordinary notion that a nation cannot stand still in its civilisation correct or not?

Will England continue to be a promoter of, and permanent resting place for, the Arts and Sciences?

Is it easier to obtain a position of eminence now than it was a century ago?

Has the discovery of Gunpowder been beneficial to mankind?

The steam engine or the printing press—Which has done most for civilisation?

POLITICS.

Whether the Feudal or Commercial System has been most favourable to the development of high principles?

Is an hereditary monarchy preferable to an elective one?

Which is preferable, Centralization or Local Government?

Ought a Member of Parliament to vote according to his own opinions or those of his constituency?

Is Universal Suffrage desirable?

Is the educational franchise worthy of adoption?

What are the proper functions of a Government?

Ought the Government to lead public opinion or be led by it?

Is the Union of Church and State desirable?

Is the admission of military and naval men into civil governments beneficial?

Is the continued accession of territory to England in India necessary and expedient?

Were the means by which our Indian Empire was acquired consistent with sound national policy?

Is the retention of India conducive to the welfare of the British Empire?

Are the Natives of India justified in their attempts to throw off the British yoke?

What are the best means to be adopted for the abolition of slavery?

Is Monarchy more favourable than Democracy to excellence in the Arts and Sciences?

Is consistency in public men on the decline?

Do sudden reforms usually tend to advance the interests of the community?

Was the statesmanship of the late Sir Robert Peel conducive to the welfare of Great Britain?

Is Emigration beneficial, and how should it be conducted?

Is the influence of Society on Government greater than that of Government on Society?

Is Russia entitled to rank among the civilised nations?

Is a nation better for having enemies?

Has England those elements of decay which characterised the nations of antiquity?

Ought the Press to be entirely Free from State control?

Ought Government to interfere with the liberty of the Press, when that liberty is used for the purposes of immorality?

POLITICAL ECONOMY.

Is self-interest the right basis for Commercial action?

Competition—Co operation—Which principle is best adapted to the Present State of Society?

Is exclusive monopoly a greater evil than reckless competition?

Would a community of goods promote the welfare of man?

Ought money to be intrinsic or symbolical?

Is direct or indirect taxation the better mode of levying for purposes of revenue?

Is the National Debt to be considered a grievance?

Under what circumstances is it desirable to maintain a surplus revenue for the purpose of paying off a National Debt?

To what extent is the pressure of the National Debt of this country lessened by mitigating circumstances, arising out of the facilities which it affords to certain kinds of business?

Is there a tendency in nations to attain a stationary condition of Wealth?

Should commercial privileges be granted by one nation to another otherwise than on the principle of reciprocity?

Can one nation become richer without another becoming poorer?

According to what principle is the benefit of the trade between two nations shared between those two nations?

Would a reduction of the import duties upon the produce of foreign countries, if unaccompanied by an equivalent reduction upon British goods in foreign ports, have the effect of altering the distribution of the precious metals to the disadvantage of this country, and of causing the produce of a given quantity of British labour to be exchanged for the produce of a less quantity of Foreign labour?

Ought taxation to press equally on the capital of skill and the capital of property?

Is it beneficial or injurious that vagrants begging from door to door should be relieved?

Is Capital or Labour the more valuable instrument of production?

The economy of labour—how has it affected the working classes?

Are Trade Unions as at present constituted the best means of obtaining a fair day's wages for a fair day's work?

Are strikes beneficial to the working man?

Have the working classes been benefited by machinery?

Are the "Art Union" lotteries contrary to sound principles of trade, and destructive of a healthy moral tone amongst the community?

What are the distinctions to be properly drawn between Free Trade and *Laissez Faire*?

What are the objections to a circulation of One Pound notes, issued by the Bank of England and by the Provincial Bankers?

What are the mode and degree in which the facilities afforded by railways in this country have led to a saving of capital and to a diminution of cost of production?

What effects has the observance of the Seventh Day had on the production and distribution of Wealth?

To what extent does Quantity as well as Cost of Production determine the exchangeable value of Gold and Silver?

Are there at present pressing on Industry and Production in this country any considerable direct or indirect Taxes, which admit of being greatly reduced or wholly removed without serious injury to the Revenue?

To what extent, if any, have the Poorer Classes of this Country partaken of the large increase in wealth, and its attendant conveniences, during the last hundred years?

To what extent, if any, have the recent discoveries of Gold affected its value in relation to other commodities?

What is the nature of the process by which the influx of the New Gold from California and Australia has added, and is adding, to the Real Wealth of the World?

Is there good reason to believe that, under the present circumstances of this country, the best provision that can be made for lessening the burden of the National Debt consists in removing oppressive Fiscal Taxes, so as to increase the ability of the country to provide the annual interest?

Is there any adequate reason for authorizing or permitting the issue of paper currency, not representing actual deposits of coin or of the precious metals?

Is there any adequate foundation for the doctrine that the issue of Bank Notes is an exclusive function or prerogative of the Sovereign or State?

Are there any valid objections to the application of Limited Liability to Joint Stock Banks?

Instead of instituting Courts for facilitating the recovery of Small Debts, would it be better to place them beyond the pale of the law?

Is it expedient that Government should concentrate labour in a New Colony by laying a price on land?

What would be the effect on the wealth of Great Britain, if all the principal landholders and stockholders were to devote all their revenues, beyond their own subsistence, to productive purposes?

In the absence of disturbing causes is it more likely that—in a given country—population will increase more rapidly than subsistence, or subsistence more rapidly than population?

Are there any circumstances to be conceived, in the situation of Great Britain, to render a free trade with France otherwise than beneficial to both countries?

Under what circumstances is the absenteeism of landed proprietors detrimental to the wealth of a country?

Is it expedient that the legislature should in any, and what cases, interfere in contracts between the employer and labourer, to regulate the hours and mode of labour?

Are there any good grounds for thinking that either the wealth or prosperity of Great Britain would be at all impaired by Canada becoming independent, or being incorporated with the United States?

Which is best, a tax upon property, upon income, or upon expenditure?

Does taxation on the commodities consumed by the

labourer, raise wages under any, and what, circumstances?

What is the most equitable mode of assessing an Income Tax?

Is there sufficient reason for the popular assumption that the progress of British prosperity is seriously checked by the pressure of existing Taxation?

Is there any, and what, ground for the dictum of Adam Smith, that the Foreign trade of a country gives less encouragement to its industry or productive labour than is afforded by its Home trade?

On what principle should privileges or rewards be granted in respect of Inventions?

Are Copy-right and Patent-right founded on justice, or merely on sufferance, and are those terms misnomers?

Does that law which gives to Inventors the monopoly of their Invention for a certain number of years thereby cause the amount of National Wealth to be greater than it would be, were no such exclusive privilege conceded to Inventors?

Can it, under any circumstances whatever, be advantageous to raise the money required for the public expenditure by means of a Loan, instead of immediate taxation?

Under what circumstances are Governments justified in distributing the present charges of Wars, by loans payable by people who have not undertaken them?

Are there any, and what, limits to the principle, that the physical wants of the community are best supplied by the agency of competition?

To what partnerships should the principle of Limited Liability extend, and with what Safeguards should it be attended?

Are there any circumstances in the progress of Arts and Manufactures which tend to Maintain or to Advance Wages, irrespective of the number of Labourers in the Market?

What are the legitimate limitations, if any, on economical grounds, to the absolute power of disposing of property by Will?

What would be the effects on the production and distribution of Wealth, if the owners of Property were further restrained from settling it, or from preventing, for long periods after their decease, the absolute Ownership from becoming vested?

What in this country would be the probable Economical consequences of a Government based on Universal Suffrage?

To what extent, if any, is it justifiable or advisable to depart from the strict rules of Political Economy, in dealing with the Social Condition of a people?

Is the distribution of Newspapers and Books by the Post-Office at variance with the principles of Political Economy, and, if not, would it be any violation of those principles to employ the machinery of the department in the distribution of small parcels generally?

In the present state of railway enterprise in this country, how far is it true that the public convenience and profit may be best advanced by promoting the amalgamation of Lines, with a view to a Regulated Monopoly, rather than by encouraging competition in the ordinary sense?

What are the considerations, if any, which should induce a Country to discourage or prevent the exportation of Commodities in the production of which it possesses pre-eminent or exclusive advantages?

If financial necessities or readjustments should compel an early recourse to increased Taxes, what kind of new, or what addition to existing, Taxes would be open to the least objection?

What are the causes which prevent the Poorest Classes in this country from enjoying a larger Share in the advantages of our increasing Wealth and the progress of Improvement?

Are there any good grounds for believing that it would be possible in this Country largely to establish any arrangements or plans under which Persons Employed may share, to a greater or smaller extent, in the profit and loss results of the business carried on by their Employers?

Are there any reasons for believing that a law designed to diminish the prevalence of Credit in this country, by denying legal validity to debts of longer standing than three months, would be economically advantageous?

SOCIAL SCIENCE AND THE AMENDMENT OF THE LAW.

What are the best means of improving the condition of the working classes?

Is it the duty of the municipal authorities of large towns to provide suitable homes for the working classes?

The Amendment of the Physical should precede that of the Mental and Moral condition of the Masses.

Is the welfare of a people promoted better by individual or associative efforts?

Is it desirable that the different trades, professions, and clerkships should be thrown open for the employment of women?

Should literary and scientific occupation be followed by the female sex in order to their maintenance?

If facilities were afforded for ladies to study and practise as Physicians, would it be beneficial to the community?

Would a Legislative Enactment for the Observance of stated National Holidays conduce to the Physical, Moral, and Religious well-being of the Community?

Would the general adoption of early closing conduce to the social and moral elevation of the classes intended to be benefited by it?

Would the revival of national sports tend to the improvement of English character?

Does morality increase with civilisation?

Should our law relating to refugees and aliens be altered?

Should the public sale of intoxicating liquors be restricted by Law?

Are Pawnbrokers a public evil or a public good?

Is the present system of Apprenticeship based upon sound principles?

Would it be better for society if men sought the happiness of others in preference to their own?

Is the principle of life assurance worthy the support of the working classes?

Would it be advisable to introduce a Decimal System of Coins, Weights, Measures, and Accounts into this country?

Which is the more injurious to society—the spendthrift or the miser?

Is poverty or wealth the greater incentive to crime?

With the object of preventing fraud and over-speculation, should the laws which relate to commerce be more stringent?

Would the abolition of the Law of Primogeniture be beneficial to Society?

Ought capital punishments to be abolished?

Is the establishment of a court of criminal appeal desirable?

Should Quackery be prohibited, and penalties inflicted by Law?

Should cases of Insolvency be settled solely by Tribunals of Commerce, without the intervention of lawyers?

Should Insanity be allowed as a ground of acquittal, or of mitigation of punishment?

Should the system of granting Tickets-of-leave to Criminals be abolished?

Should a unanimous verdict be required from juries?

Ought imprisonment for debt to be abolished?

ETHICS.

Is an advocate justified in pleading the cause of one whom he knows to be guilty?

Does effectual Revenge or meek Endurance of Injuries indicate the greater strength of mind?

Ought the conduct of a man to be influenced by Public Opinion?

Is man's will entirely controlled by circumstances?

Can any circumstances justify a departure from the truth?

Is ambition a vice or a virtue?

How far is war justifiable?

EDUCATION, SCIENCE, &c.

Ought Government to provide Education for the people? Ought the Education of the people to be under the control or regulation of a public office?

Is a general, and consequently a comparatively superficial, knowledge more conducive to the happiness of individuals than one that is more limited and profound?

Is a classical education the best training for commercial men?

Which are of the greater importance in Education, the Classics or Mathematics?

Is the study of History of more importance to a young man than that of Science?

Which is the more conducive to the improvement of the mind—the study of History or the reading of Poetry?

Is the cultivation of Music beneficial as a branch of National Education?

Ought Social Economy to form a subject of Elementary Instruction in Public Schools?

Should Education be conducted on a system which admits of rewards, punishments, and emulation?

In school discipline is the infliction of corporeal punishment justifiable?

Is the education of the present day calculated to prevent crime?

What system of education is best suited to elevate the rising generation?

Is the reading of light literature prejudicial to the formation of good habits?

Do satirical writings and the public personification of defects of character exercise a good influence on National Character and Public Morality?

In what manner, under present circumstances, may Science and Learning be best promoted in England by the application of private funds, and by the intervention of the Government?

Should Science rather than the Fine Arts form a portion of National Education?

Would the more general study of the Fine Arts tend to the moral elevation of the people?

Is the influence of the drama beneficial?

Can thought be better expressed by Sculpture than by Painting?

Of Painting and Poetry which is the greater art?

Was the poet right when he said,—

“A little learning is a dangerous thing?”

Has the progress of modern art produced a good moral effect on national and individual character?

Is the faculty of Reason confined to Man?

Is it probable the Planets are inhabited?

Whether Creed or Climate has the greater influence on mankind?

Has Nature or Education the greater influence in the formation of character?

Is Education or Wealth most calculated to promote the happiness of man?

Does Engagement in Trade or Manual Labour necessarily prevent a man becoming successful in a mental pursuit?

LITERATURE.

Is the English language more indebted to its poet than its prose writers?

Are the moderns or the ancients the truer poets?

Was Shakspeare a greater tragedian than comedian?

The merits of Shakspeare and Milton as poets.

The English poets from Chaucer to Milton are superior to the modern.

British Essayists of the last century.

Cowper—his life and poems.

Which was the greater poet—Byron or Burns?

Was Sir Walter Scott, as a Poet, superior to Lord Byron?

The philosophy of Goethe's "Faust" is equal to that of "Macbeth."

The serious side of Charles Dickens.

What is the moral tendency of the writings of Charles Dickens?

Which has the greater power in the delineation of human character—Dickens or Bulwer?

Longfellow and his poems.

Are the moral, intellectual, and social tendencies of the literary satirists of the past fifty years more salutary and effective than those of the preceding?

Is the cheap literature of the age on the whole beneficial to general morality?

MISCELLANEOUS.

Are we better servants of our times by being contented or discontented with them?

Do circumstances make men, or men make circumstances?

Is the tendency of Field Sports beneficial?

Love of country; is it inherent in men?

Which character is the more to be admired, Dr. Arnold or the Rev. Sidney Smith?

Do great men make the age or the age great men?

Is procrastination or precipitancy the greater evil?

When does man experience most happiness—in the pursuit or the attainment of an object?

Which country is most suitable for colonisation, Canada or Australia?

Which profession gives the best opportunities of judging of human character, Divinity, Law, or Physic?

Is it possible for man to act without consideration of his own gratification or advantage?

Is military renown a fit object of ambition?

Ambition or curiosity—which has led to the more important discoveries?

Literary fame or military glory—which tends more to immortalise a man's name?

Which tends more to elevate character—the proverbial bluntness of the English or the refined courtesy of Continental nations.

The Man of Action—the Man of Thought—which is the more Useful to Society?

Which is the more valuable member of society, a great mechanician or a great poet?

Are the intellectual qualities of the sexes equal?

Ought a youth to have choice of his own pursuit in life?

Does Moral or Money power exercise the greater influence on the Human mind?

Which exercises the greater influence in the civilisation and happiness of the human race, the male or the female mind?

Do we derive the greatest amount of pleasure from Hope or Memory?

Whether malice or thoughtlessness has been productive of most evil in the world?

Has the fear of punishment or the hope of reward the greater influence on human conduct?

From which does the mind gain the more knowledge, reading or observation?

Which does most to make the Orator—Knowledge, Nature or Art.

Is Example without Precept more powerful than Precept without Example?

Liberty—the meaning and value of the word.

What would be the best means of making Mechanics' Institutions more popular?

The following publications may be read with advantage by young men desirous of cultivating the faculty of extempore speaking:—

Practical Hints to Unpractised Lecturers to the Working Classes. By Benjamin Scott, Secretary to the Working Men's Educational Union. Baron, 25, King William-street, West Strand (1851); pp. 30, 6d.

The Speaker at Home; or Chapters on Public Speaking and Reading Aloud. By the Rev. J. J. Holcombe, M.A. Bell and Daldy, 186, Fleet-street; pp. 180, 3s. 6d.
The Art of Extempore Speaking. By M. Bontain. (Translated from the French.) Bosworth, 215, Regent-street; pp. 300, 5s. (This is a treatise of great ability.)

The following brief extracts from the rules of an existing debating club may be found useful:—

"It shall be the object of the class to encourage, as far as possible, rather a regulated conversational discussion of the questions brought before it, than the delivery of formal speeches. No member, however, shall be entitled to speak twice on the same question, save its proposer, who shall have a right of reply. Lengthy written papers also shall be considered as inadmissible.

"Each meeting shall appoint its own chairman for the evening.

"Without being precisely a matter of absolute obligation, it shall be considered the duty of each member to introduce a question, as far as practicable, in his turn.

"The committee shall, in the first instance, decide on the eligibility of the questions proposed, as fitting topics for discussion. It shall be a standing instruction to the committee to require all questions to be worded with as much conciseness, and as accurately and carefully as possible."

Subjoined are some suggestions for promoting the efficiency of discussions in debating-classes in Mechanics' Institutes:—

1. Before a question is finally entered for discussion let the mover of it carefully consider the terms on which it is proposed, so as to render the phraseology as exact and significant as possible. This precaution would generally prevent the discussion from becoming a mere dispute about words.

2. The Chairman should have a chair, and should take some little pains to master the rules applicable to his office. A very excellent little manual on the subject is the following, "The Chairman and Speaker's Guide," by Thomas Smith. Longmans, 1s.

3. No language in the least degree discourteous should be permitted, and no imputation of motives should be allowed in any form.

4. Upon merely abstract or general questions, it is not desirable that the meeting should proceed to any vote, or record any formal division. Leave the discussion to produce its effects on individual minds.

5. It is convenient on some occasions to limit speakers to 10 or 15 minutes, but there are many subjects upon which a meeting would do well to allow a good speaker, who can really argue the case, to unfold his views at length.

6. The opener of the debate may be allowed to read from a MS, but no such privilege should be permitted to those who follow him. It is of the essence of a useful debate that it should be extemporaneous.

MECHANICS' INSTITUTES AND POPULAR RECREATION.

The committee of the Leeds Mechanics' Institution have agreed to give a prize of five guineas for the best Essay on "Mechanics' Institutes and Popular Recreations, with special reference to the question how far it is desirable to combine them." Each Essay must bear a distinguishing motto, and be sent under cover to the secretary, together with a sealed envelope bearing a similar motto, and containing the name and address of the writer, on or before the 1st of October next. The Essays will be sent for adjudication to Edward Akroyd, Esq., Halifax; John Hope Shaw, Esq., Leeds; Darnton Lupton, Esq., Leeds; and the award will be made on the 1st November.

The Essay, which should not occupy more than one hour in reading, will be read by the successful competitor in the lecture-hall of Leeds Mechanics' Institution. Competitors must be members of Institutes in the Yorkshire Union.

Home Correspondence.

RECREATION AT MECHANICS' INSTITUTES.

SIR,—The importance of making the recreation of the members a feature in the operations of Mechanics' Institutes, has, no doubt, obtained much additional publicity by the prominence which was given to it in the discussion at the recent Conference. Advantage, however, should now be taken of it by entering more into details, and obtaining as far as possible the experience of those Institutes whose experiments in this direction have been tried. For this purpose it is desirable that communications should be freely made to the *Journal*, so that in the multitude of counsellors there may be found safety. On such a question, which many believe to be fraught with danger, all experience is of some value; and now that the *Journal* is not occupied with the valuable papers read during the session of the Society of Arts, a valuable opportunity is afforded for the dissemination of much useful information.

It is true Mechanics' and similar Institutes have been established ostensibly and really for the promotion of the study of science and literature, for the encouragement of intellectual tastes, and the cultivation of the mental faculties. Wherever the desire for such objects exists to any great extent, an Institute is almost necessarily successful, for the want is felt, and the remedy eagerly sought; but, unfortunately, amongst the great majority of our population—the imperfectly educated people who live by the labour of their hands—it is the desire for mental improvement which has to be cultivated, and this is the great difficulty with which the managers of Institutes have to contend. Appeals to the presumed common-sense of working people have repeatedly been made, and glowing descriptions of the substantial advantages arising from mental culture have been given by eloquent lecturers and others. No one has disputed the justness of the conclusions drawn, or denied the greatness of the benefits promised, yet most has been in vain, because the majority of the people have wanted the self-denial, the perseverance, the determination indispensable to the acquisition of the gain desired. The advantage to be earned was great, but too remote to be appreciated, too apparently unattainable to be worth the sacrifice of present enjoyment.

That this statement is by no means an exaggeration, might be shown by reference to the most successful Mechanics' Institutes, which, confined to educational or literary efforts, leaves far more undone than it accomplishes. In some small villages, where the chief advantage of an Institute is a circulating library, the number of members may average one in ten of the population, whilst in Huddersfield, where the two Institutes number above 1,500 members, the proportion is only one in thirty-four of the population, notwithstanding the continuous and judicious labours of a model secretary and a really working committee, so that many thousands of the working people are yet unprovided for.

It has not been sufficiently borne in mind that man is a social being, depending more upon the sympathy of his fellow-men, and relying more for his enjoyment upon social intercourse than on any presumed advantage to himself from solitary occupation. Were it not for this feeling would hundreds of thousands flock to Epsom on a Derby-day for the evanescent gratification derived from the passing glimpse of a horse-race of which they know but little and care less? The working man, relieved from the toils of his daily labour, seeks for relaxation in society; and while it is practically denied him in the Institute, where

he must not talk, but read or learn, he resorts to the public-house, where he can in a great measure do as he will.

It is for these reasons that it becomes a question for the serious consideration of the managers of Institutes whether they might not largely extend their influence, and more effectually promote their real object, by paying greater attention to the tastes and inclinations, as well as the higher interests of those whom they seek to bring within their walls. If to a reading-room were added a conversation room, in which greater indulgences were permitted, the Institute, by becoming more attractive, would also become more really useful; and if no other result were accomplished than weaning so many from less innocent gratifications, one step would be gained in the right direction, and the foundation prepared for still further improvement.

At Faversham, where the employment is almost confined to the making of bricks and gunpowder, an Institute has been conducted so judiciously and so successfully that it may fairly challenge rivalry with any other. A handsome and commodious building has been erected, at a cost of about £2,000; and a monthly journal is circulated gratuitously amongst the numerous members. Its great success is chiefly attributable to the zeal and energy of Mr. F. W. Monk, the managing director; and if he would oblige your readers with some details as to his proceedings, they must supply some valuable hints and suggestions to other less favoured places.

It would be as well perhaps to start with the conviction that all the people of this country, or at least with very few exceptions, are intelligent beings, capable of being influenced for their own good; that wherever an Institute has been a failure the right means have not been tried; that the most important question for consideration is the choice of the best course to pursue; and that ultimate success is almost certain if, without too strict adherence to preconceived notions, the Institute be adapted to the wishes as well as the wants of the population.

I am &c.,

BARNETT BLAKE.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

For
Numb.

- Delivered on 25th June, 1862.*
327. East India (Waste Lands)—Return.
160. Bill—African Slave Trade Treaty.
- Delivered on 26th June, 1862.*
345. Municipal Boroughs (Ireland)—Paper.
348. Children in Workhouses (Ireland)—Return.
349. St. Catherine's Harbour (Jersey)—Return.
352. Army (Yeomanry Volunteer Corps)—Supplemental Estimate
357. National Defences—Return.
307 (A1.) Poor Rates and Pauperism—Return (A).
297. Drainage (Ireland) Bill—Minutes of Evidence, &c.
344. Thames Embankment Bill—Report and Evidence.
163. Bills—Lunatics Law Amendment.
164. " Coal Mines.
165. " Newspapers, &c.
- Delivered on 27th June, 1862.*
355. Emigration (North American Colonies)—Return.
298. East India (European Troops)—Return.
354. East India (Finances)—Return.
162. Bills—Thames Embankment (as amended by the Select Committee.)
167. " Endowed Schools.
168. " Fortifications (Provision for Expenses).
169. " Windsor Castle (Bakehouse).
Census of Scotland (1861)—Population Tables and Report.
- Delivered on 1st July, 1862.*
237. Loan Societies—Abstract of Accounts.
339. Lunatic Asylums (Ireland)—Return.
340. Scottish Universities—Paper.
341. Coals, Cinders, and Culm, etc.—Account.
353. Sandhurst College—Regulations.
- Delivered on 2nd July, 1862.*
175. Bills—Tramways (as amended by the Select Committee).
176. " Transfer of Land (amended).
177. " Church Rates Redemption.
178. " Duchy of Cornwall Lands (Completion of Arrangements).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, July 4th, 1862.]

Dated 17th May, 1862.

1504. C. H. Tessier, Thurlow-place, Brompton—A new safety lock. (A com.)

Dated 23rd May, 1862.

1559. J. Ward, Radford, and J. Dewick, New Lenton, Nottinghamshire—Imp. in machinery or apparatus for the manufacture of textile or looped fabrics.

Dated 27th May, 1862.

1582. C. A. M. Durand, Penjard, France—A new kind of water mill.

Dated 31st May, 1862.

1641. A. Moreau and A. E. Ragon, Bernard-street, Russell-square—Imp. in electro-magnetic machines or apparatus.

1651. W. E. Newton, 66, Chancery-lane—Imp. in the treatment of cloth and other textures, leather, or animal tissues, for the purpose of rendering them more durable and impermeable to water and other fluids, and for producing from any firm fibrous texture, such as cloth, cotton, woollen or mixed goods, a durable artificial leather. (A com.)

1653. W. E. Newton, 66, Chancery-lane—Imp. in the construction and operation of shot proof gun towers and the working of the guns therein for sea vessels, floating harbour defences, forts, or land fortifications. (A com.)

Dated 4th June, 1862.

1691. E. Conroy, Drummond-street, Euston-square—Improved machinery for cutting corks, bungs, and such like articles.

Dated 5th June, 1862.

1695. R. Robinson, 18, Fish-street, Hull—Imp. in fire escapes, parts of which improvements are also applicable to the construction of vessels for commercial and other purposes.

Dated 10th June, 1862.

1725. T. Lister, Hipperholme, near Halifax—Imp. in the material to be employed for address-cards, visiting cards, labels, railway tickets, and other similar articles, whether for printing or writing upon.

Dated 13th June, 1862.

1762. J. Bermingham, Cork—Imp. in the construction of vessels of war, parts of which improvements are also applicable to the construction of vessels for commercial and other purposes.

Dated 16th June, 1862.

1778. F. M. Lanoa, 49, Boulevard Mont Parnasse, Paris—An improved geodetic or topographic instrument, intended to combine in one all the instruments now used in surveying.

Dated 17th June, 1862.

1792. Lieut.-Col. M. Turner, Wigston, Leicestershire, and E. T. Loseby, Wood-street—Imp. in small arms and ordnance, and in sights for the same, part of which may be used for measuring distances.

Dated 19th June, 1862.

1802. W. Clark, Quadrant-road, Highbury New-park, Islington—Imp. in the manufacture of that kind of boxes known as dry goods boxes.

Dated 20th June, 1862.

1814. W. Jeffries, West Bromwich, Staffordshire—A new or improved rail for railways, and a new or improved chair or sleeper for the said rail.

1820. D. Adamson, Newton Moor, Cheshire, and L. Leigh, St. Petersburg—Imp. in the construction of steam boilers, and in apparatus connected therewith, part of which is applicable to shipbuilding.

1824. C. Osman, Chryssell-road, Brixton—Imp. in the manufacture of elastic or yielding surfaces for sitting, lying, or reclining upon, part of which improvements are applicable to other purposes.

1826. G. Gray and D. Cunningham, Whiteburn, Linlithgow—Imp. in applying a new material to be used as a substitute for the "blackening" or other materials employed in casting or moulding metals.

Dated 21st June, 1862.

1828. F. E. Schneider and J. Snider, jun., 25, Walpole-street, New Cross, Surrey—Imp. in the construction of breech-loading fire-arms.

1130. J. Taylor, Oldham—An improved "doffer" or "stripper" for carding engines for preparing cotton and other fibrous substances.

1838. F. Tolhausen, 17, Rue de Faubourg Montmartre, Paris—Imp. in apparatus for preventing collisions on railways. (A com.)

1840. J. Lawson, 2, Morris-place, Glasgow—Imp. in the manufacture of carpets and other piled fabrics.

Dated 23rd June, 1862.

1842. T. Wilson, Birmingham—A new or improved dress fastening, which said fastening is also applicable to the fastening of bands and belts in general and to other like purposes.

1846. A. Webster, Arbroath, N.B.—Imp. in machinery or apparatus for boring slate.

1848. R. Cook, Finsbury-place South—Imp. in the construction of pianoforte actions.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

1894. M. A. F. Mennons, 24, Rue du Mont Thabor, Paris—Improved means for the prevention and reduction of synovial and other swellings or tumours in the limbs of horses. (A com.)—28th June, 1862.

PATENTS SEALED.

[From Gazette, July 4th, 1862.]

July 4th.

28. J. W. Arundell.

34. J. Howden.

37. A. Warner.

40. G. Betjemann, G. W. Betjemann & J. Betjemann.

43. F. Brown.

44. F. Shaw.

45. J. Higgins and T. S. Whitworth.

46. J. Tatham.

48. A. Wallis and C. Haslam.

51. A. Heath.

56. H. Bessemer.

57. W. Bradshaw.

58. H. Cook.

59. C. W. Siemens.

60. J. Smith and S. Wellstood.

63. D. Wilson.

65. D. Wilson.

67. R. A. Brooman.

72. R. Johnson.

73. M. Wigzell.

75. J. Oates.

90. F. C. Warlich.

123. T. Myers and E. Myers.

155. H. B. Barlow.

494. T. Partridge.

870. R. Lublinski.

893. J. P. Woodbury.

967. W. E. Newton.

1164. J. C. Amos.

1190. C. E. Heinke.

1199. J. F. Allen.

1340. J. H. Johnson.

1342. B. Cooke.

1422. J. H. Johnson.

1505. E. J. Bridell.

[From Gazette July 8th, 1862.]

July 8th.

83. J. White.

85. T. Scott.

91. T. Soar, J. Belshaw, and M. Soar.

92. J. Parker, J. Wells, and B. Wells.

94. R. A. Brooman.

113. W. Cleland.

114. T. Timmins & T. Simmons.

125. J. M. Rowan.

147. E. C. Nicholson.

156. G. T. Bousfield.

167. A. J. Beer.

175. H. Owen.

203. A. Samuelson.

205. J. Lillie.

228. R. Bodmer and W. Wilson.

438. J. Nasmyth.

449. G. F. Lee.

500. J. Woodrow.

712. W. Clark.

720. H. Y. D. Scott.

735. B. Todd.

736. W. Barford.

1187. A. V. Newton.

1343. T. Cabourg.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, July 8th, 1862.]

June 30th.

1569. N. Ardaser.

1572. E. A. Wood & M. D. Rogers.

July 2nd.

1647. W. E. Newton.

July 3rd.

1586. J. Shnon.

July 4th.

1604. C. Hagan.

1627. D. Matthews.

1629. W. H. Harfield.

1630. H. Brinsmead and J. Lawrence.

1639. C. Iliffe.

1695. W. H. Harfield.

1726. W. H. Harfield.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, July 8th, 1862.]

June 30th.

1499. R. Muckelt.

July 4th.

1502. R. Tidmarsh.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4491	June 28	{ Blanch's Improved Wind Gauge Rifle Fore Sight... ..	William Harnett Blanch	Liverpool.
4492	" 30	{ Fastening for securing Scarfs or Handkerchiefs	William Charles Edge	{ 13, Owen's-row, St. John-street- road, Clerkenwell.
4493	July 7	{ An Improved Hat Suspender or Miscellaneous Clip	Thomas Kemp Mace	Bull-street, Birmingham.

Journal of the Society of Arts.

FRIDAY, JULY 18, 1862.

INTERNATIONAL EXHIBITION OF 1862.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate of £452,100, have been attached to the Deed.

SEASON TICKETS.

Season Tickets may be obtained at the Society's House, on application to Mr. S. T. Davenport, Financial Officer. The prices of the tickets are as follows:—£2 10s., admitting to the International Exhibition and the Gardens of the Royal Horticultural Society every day during the remainder of the season; £1 10s., admitting to the Exhibition only, every day; and 10s., admitting to the Exhibition on shilling days only.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October.

THE INTERNATIONAL EXHIBITION AND RAILWAY COMMUNICATION.

The Council of the Society of Arts have been in communication with the Directors of the various Railway Companies in reference to the affording special facilities for visiting the International Exhibition.

The Directors of the London and North Western Railway, in their reply to the letter of the Council, say that they have organised a scheme of excursion trains throughout the London and North-Western system, which affords to all classes the opportunity of visiting London at intervals of two or three days, and gives them the option of remaining in town for periods of either four or eight days, upon very favourable terms. They have also, in concert with the other Companies whose railways are in connection with the London and North-Western line, agreed to give effect to an arrangement by which passengers from remote places on these railways may visit and remain in London for various periods, at a cost much lower than the price of the ordinary rate of charge.

The Directors of the London, Brighton, and South-Coast Railway have made arrangements by which all return tickets issued to London,

from stations south of Red-hill, are available for one week, and they issue third-class return tickets by all third-class trains. Frequent excursion trains are also running on this line at very low fares.

The Directors of the Midland Railway have informed the Council that, from the 1st of June, they have issued return tickets from all the principal stations on the line where tickets to London are ordinarily issued, at the usual day-ticket fares (*i.e.* a fare and a half), extending the time to seven days; and have also issued third-class tickets at proportionable fares, available in like manner for seven days from the date of issue. These tickets are issued by all the trains running. They have, moreover, run excursion trains from the districts served by this Company at very low fares; and they are running night trains for the convenience of the working classes, at fares of only 5s. from Leeds and Bradford to London and back. They have also made special arrangements with several large bodies of workmen, and are quite ready to do the same with any other Societies or bodies of workmen desiring to visit the Exhibition.

Special facilities are also afforded by other Companies, information in reference to which may be obtained at the various stations.

STATE CEREMONIAL OF THE DECLARATION OF PRIZES TO EXHIBITORS.

The declaration of the Awards of the Juries was made at a state ceremony on Friday, 11th July, 1862, by an International representative body of Royal and distinguished personages, specially named by the various nations which have taken part in the Exhibition.

The Queen named His Royal Highness the Duke of Cambridge, K.G., as her Majesty's representative to receive and distribute the awards to Committees representing the Exhibitors of the United Kingdom and to the Commissioners of the Colonies and Dependencies. The Special Representatives of Foreign Countries received and distributed the awards to the Foreign Commissioners.

The Ceremonies took place in the Exhibition Buildings and in the Horticultural Gardens, which were made part of the Exhibition for that day.

At 12 o'clock the Chairmen of Juries, the Jurors, the Special Commissioner, and the Officials of the Jury Department, assembled in the South Court, where they arranged themselves in the order of their classes, each class being indicated by a banner. This procession, headed by the band of the Royal Engineers, proceeded across the nave to the Upper Terrace in the Horticultural Gardens, to await the arrival of the Special International Representatives.

Her Majesty's Ministers, the Royal Commis-

sioners for the Exhibition of 1851, the Lord Mayor and suite, the Members of the Building Committee of 1862, the Secretary of the Finance Committee and Financial Officer, the Council and Officers of the Society of Arts, and the Council and Officers of the Horticultural Society, assembled in the Conservatory at 12:30 p.m.

Her Majesty's Commissioners for the Exhibition of 1862 received the Corps Diplomatique in the Conservatory.

At 1 o'clock the Special International Representatives were received by a guard of honour at the north entrance to the Horticultural Gardens, and were met by Her Majesty's Commissioners for the Exhibition.

The Special International Representatives, accompanied by Her Majesty's Commissioners for the Exhibition of 1862 proceeded to the dais in the gardens.

Earl Granville, on the part of Her Majesty's Commissioners, made the following address of welcome to the International Representatives:—

"I have the pleasure of welcoming, on the part of Her Majesty's Commissioners for the International Exhibition, the distinguished representatives of foreign nations who honour us by taking part in the proceedings of this day. The readiness with which the Governments of foreign countries have responded to the invitation of the English Government is highly appreciated by the people of this country. I have now to request that the Special Representatives will receive the Report of the Council of Chairmen of Juries. The awards will then be delivered to Her Majesty's Commissioners. We invite the assistance of the Special Representatives to make the awards known in the building, as it will be agreeable to the exhibitors of the several countries to learn from a distinguished representative of their own nation the appreciation by the juries of their successful labours. In passing through the building the Special Representatives will not fail to observe that the industry of all nations has shown a remarkable development since the last International Exhibition—a development which, justifying the anticipation of an illustrious Prince, now, alas! no more, owes much to the facility given by such exhibitions for comparing the state of industry in each country, and affords a starting point for further progress."

Lord Taunton, as President of the Council of the Chairmen of Juries, then read the following Report:—

"The work of the several juries having been brought to a termination, it becomes the duty of the Council of Chairmen to explain the manner in which the juries were constituted, and the result of their labours.

"The juries consisted of English and foreign members in varying proportions. The English jurors were in the first place nominated by exhibitors, and, these nominations having been carefully considered, Her Majesty's Commissioners invariably appointed such persons as appeared to be named by the general agreement of a trade or district. In cases where the nominations were not made on a common understanding, the Royal Commissioners were guided in their choice by the number of votes given to particular individuals, and, in some instances, by the desire expressed by exhibitors that the Commissioners should themselves select persons possessing the necessary qualifications.

"The British colonies were represented by jurors recommended by the several Colonial Commissioners.

"Foreign nations taking part in the Exhibition had a

right to nominate one juror for every class in which they were represented by 20 exhibitors, and for every section of a class in which they had 15 exhibitors. As an alternative, each nation had a certain number of jurors allotted to it, in proportion to the space which it occupied in the building, and several countries accepted this alternative. Her Majesty's Commissioners, without fixing any arbitrary proportion between foreign and English jurors, appointed as many of the latter to each jury as the experience of past exhibitions showed to be necessary for its efficiency.

"The juries were 65 in number, grouped so as to form 36 classes, or head juries, corresponding to the 36 industrial classes under which the objects are arranged in the Exhibition. Each of these head juries, when subdivided into sections, acted as a united body for the confirmation of awards. Before, however, these awards were considered final, they were brought before and received the sanction of a Council, consisting of the chairmen of the 36 head juries. The chairmen forming the Council which regulated the affairs of the juries were nominated by Her Majesty's Commissioners from the jurors of different nations, a number being allotted to each country relatively to the space assigned to it in the building. The Council was presided over by a chairman appointed by Her Majesty's Commissioners.

"Her Majesty's Commissioners decided that only one description of medal should be awarded by the juries. This decision considerably facilitated their labours, as it became necessary only to reward excellence wherever it was found, without reference to competition between exhibitors. As the work of the juries advanced it was ascertained that many articles possessed excellence of a kind which deserved a special mention, without, however, entitling them to a medal; and, although it involved some departure from the principle that had been originally laid down, yet the Council of Chairmen acceded to the wish of the juries, and permitted such cases to be classed and published under the title of 'honourable mentions.'

"The jurors and their associates engaged in examining the objects of the Exhibition amounted to 615 persons, of whom 287 were foreigners and 328 English. They are men of high social, scientific, and industrial position, drawn from nearly every civilized country in the world. Their labours have occupied two months, and have been of the most arduous description, as they had to examine the objects displayed by at least 25,000 exhibitors. It can scarcely be expected that none of the articles exhibited have escaped their attention. In a few instances the delay of arrival or of arrangement has rendered it impossible for the juries to examine every article now within the building; while, in other cases, errors in classification have rendered it doubtful to which of the juries the duty of examining some particular objects should fall. Every effort, however, has been made to conquer these obstacles, and the omissions, if any, must be very few in number, and are not owing to the want of attention of the juries or of the officers engaged in facilitating their work.

"The number of medals voted by the juries amount to nearly 7,000, and the 'honourable mentions' to about 5,300. The proportion of awards to exhibitors is greater than in the International Exhibition of 1851, but less than in that of 1855.

"Notwithstanding the varied nationalities represented in the juries, it is gratifying to record that the utmost harmony has prevailed during the whole time that the jurors have been associated in their labours. The mutual dependence and intimate alliance between the industries of the world have been illustrated by the zealous and impartial efforts of the jurors of different nations to recognise and reward the merit displayed in the exhibitions of their industrial competitors.

"We are glad to observe that the state of industry, as shown in the International Exhibition, gives evidence of a singularly active and healthy progress throughout the civilised world; for, while we find every nation searching for new raw materials or utilising products hitherto con-

sidered as waste, we are struck especially with the vast improvement in the machinery employed to adapt them to industrial purposes, as well as with the application of science and with the great and successful attention which is now given to all the arts' necessary to gratify our taste and sense of beauty.

"We cannot conclude this report without expressing our obligations to Dr. Lyon Playfair, the Special Commissioner for Juries, for the constant and intelligent assistance which he has rendered to us throughout our labours, as well as to the Deputy Commissioners and Secretary who have acted under his direction, and have afforded efficient aid to the several juries during their inquiries."

To these addresses the Duke of Cambridge made the following reply:—

"In performing the duty entrusted to me by Her Majesty on this occasion, I have great pleasure, on behalf of the representatives of the various nations which have taken part in this Exhibition, in receiving from your Lordship an account of the labours of the juries. All countries owe a debt of gratitude to the large number of jurors, who, at a great sacrifice of time and personal convenience, have gratuitously undertaken a work of such an arduous description. The efforts made by so many distinguished men of different nations to recognise and reward the exhibitors from all parts of the civilised world cannot be too highly appreciated. I have every confidence that the decisions of the jurors will meet with general approbation, and that the knowledge acquired by them in the discharge of the duties which they have so well performed will be the means of giving a new impulse to industrial progress in the countries which selected such eminent representatives of their scientific and manufacturing skill."

The Juries then passed in front of the dais, and the Chairman of each Jury delivered to Earl Granville, the President of Her Majesty's Commissioners, the Awards made by their several Juries.

Earl Granville then presented to the Special International Representatives a list of the Awards belonging to their respective countries.

The Special International Representatives proceeded to make known the awards in the building. The procession for this purpose was as follows:—

State Trumpeters.

SPECIAL INTERNATIONAL REPRESENTATIVES.

Her Majesty's Commissioners for Exhibition of 1862.

Her Majesty's Ministers.

Her Majesty's Commissioners for Exhibition of 1851.

The Right Hon. The Lord Mayor of London and Suite.

The Jurors, Special Commissioner, Deputy Commissioners of Juries, and Secretary.

Members of Building Committee, Architect, and Contractors.

Financial Officers and Assistant Secretary.

Council and Officers of the Society of Arts.

Council and Officers of the Horticultural Society.

This procession entered by the Eastern Annex, and then passed along the Nave, and through the Western or Machinery Annex and Arcades; and at certain appointed Stations the Special International Representatives delivered the Awards to the respective Classes, Colonies, and Foreign Countries.

At the Stations on the British side of the Exhibition were assembled the respective National and Trade Committees, including the Mayors of the chief Manufacturing Towns; these Committees, on the part of the Exhibitors of the several Classes, received the Awards from His Royal Highness the Duke of Cambridge. At the Station for the Colonies, the Colonial Commissioners received the Awards from His Royal Highness the Duke of Cambridge. On the Foreign side each Foreign Commission received the Awards from the Special Representative named by their own Country, or in the absence of such a Representative, from His Royal Highness the Duke of Cambridge.

At the conclusion of the Ceremony, the procession returned to the Dais, and the whole of the Military Bands assembled, and played "God Save the Queen."

Military Bands (British and Foreign) were stationed in different parts of the Buildings and Grounds. The British Military Bands were those of the Royal Horse Guards Blue, the 2d Life Guards, the Royal Artillery (two Bands), the Royal Engineers, the Grenadiers, the Coldstreams, and the Scots Fusilier Guards, the Royal Marines, and the Volunteer Engineers. The Foreign Bands were the Band of the Zouaves de la Garde Imperiale, the Band of the Gendarmerie de la Garde Imperiale, the Band of the Belgian Guides, and the Band of His Highness the Pacha of Egypt. A Band from a Danish Man-of-war was also present.

CENTRAL COMMITTEE OF EDUCATIONAL UNIONS.

EXAMINATIONS, MARCH, 1862.

The following is a list of the Candidates who obtained Certificates in the Elementary Examinations held in March last:—

ALDERSHOT DISTRICT LOCAL BOARD.

JUNIOR CANDIDATES.

Number of Candidates examined..... 2 | Number of Candidates passed 2

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	Age.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.			
			Arithmetic.	Gospel History.	English History.	Geography.
William Fabian	Aldershot	15	—	—	—	—
Thomas Trout	Aldershot Institution	17	—	—	—	—

HERTFORD LOCAL BOARD.

SENIOR CANDIDATES.

Number of Candidates examined 1 | Number of Candidates passed 1

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	Age.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.		
			Arithmetic.	Geography and English History.	St. Matthew and Acts.
Joliffe, James W.	{ Liberty of Brickendon. Hertford	19	—	—	—

JUNIOR CANDIDATES.

Number of Candidates examined..... 6 | Number of Candidates passed 5

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	Age.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.		
			Arithmetic.	Gospel History.	Geography of England.
Clerk, William	Hertingfordbury	20	—	—	—
Peat, Arthur.....	Hertingfordbury	16	—	—	—
Digby, Edward	Hertingfordbury	17	—	—	—
Cox, William	Hertford	14	—	—	—
Mansfield, Ephraim.....	Hertford	13	—	—	—

LEEDS YOUNG MEN'S CHRISTIAN ASSOCIATION.

SENIOR CANDIDATES.

Number of Candidates Examined..... 11 | Number of Candidates Passed..... 8

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	SUBJECT IN WHICH EACH CANDIDATE HAS PASSED.		
			Arithmetic.	Geography and English History.	St. Matthew and Acts of Apostles.
William Todd	{ Young Men's Christian As- sociation, Leeds	15	—	—	—
James Cliff		19	—	—	—
John Kidney		12	—	—	—
Charles H. Pearson	{ Mr. Jas. K. Dall's Academy, Leeds.....	14	—	—	—
Henry S. Booth.....		15	—	—	—
Thomas Scholey		15	—	—	—
Thomas Dawson	{ Mr. William Watson's Academy, Leeds	13	—	—	—
John Hardisty		13	—	—	—

JUNIOR CANDIDATES.

Number of Candidates Examined..... 32 | Number of Candidates Passed..... 15

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.			
			Arithmetic.	Gospel History.	English History.	Geography.
Wm. M. Barratt	{ Young Men's Christian Association, Leeds	13	—	—	—	—
Samuel Cook		15	—	—	—	—
Tom Batt		15	—	—	—	—
Arnott Loveday		15	—	—	—	—
Jas. Hardy		13	—	—	—	—
Josh. Walker		13	—	—	—	—
Alfred Midgley		13	—	—	—	—
Wm. Bradley		13	—	—	—	—
Josh. Clark	{ Mr. Jas. K. Dall's Academy, Leeds.....	14	—	—	—	—
Wm. Swainson.....		13	—	—	—	—
Geo. Strickland		13	—	—	—	—
Walter S. Booth		12	—	—	—	—
Edwin Hill	{ Mr. William Watson's Academy, Leeds	13	—	—	—	—
Josh. Anderson		11	—	—	—	—
John K. Child		10	—	—	—	—

SOUTHERN COUNTIES ADULT EDUCATIONAL SOCIETY—35 LOCAL CENTRES,

SENIOR CANDIDATES.

Number of Candidates Examined 58 | Number of Candidates Passed..... 33

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.			
			Arithmetic.	Geography and English History.	St. Matthew and Acts.	Needlework.
Lucy Christmas	Alton school	18	—	—	—	—
Ellen Chandler	Alton school	16	—	—	—	—
Jane Dubber	Alton school	17	—	—	—	—
Amelia Ayling	Alton school	17	—	—	—	—
Alfred Smith	Chute school	15	—	—	—	—
Thos. Elliott	Derry-hill school	18	—	—	—	—
Frederick Lennen	Cranbourne school	17	—	—	—	—
William James	Ashton school	17	—	—	—	—
J. W. Hilsden	Lyme school	19	—	—	—	—
James Cross	Whitechurch (Dorset) school..	14	—	—	—	—
Alfred Grant	Whitechurch (Dorset) school..	15	—	—	—	—
Wm. Hobbs	Whitechurch (Dorset) school..	15	—	—	—	—
J. C. Durant	Fordingbridge school	15	—	—	—	—
James Precy	Fordingbridge school	14	—	—	—	—
George Smith	Swanage school	17	—	—	—	—
John Hanier	Swanage school	17	—	—	—	—
Tom Hixon	Swanage school	17	—	—	—	—
George Coombs	Wilton Institute	16	—	—	—	—
George Downton	Wilton Institute	14	—	—	—	—
Samuel Becher	Poole Institute	20	—	—	—	—
H. B. Elford	Poole Institute	22	—	—	—	—
W. M. Morris	Poole Institute	23	—	—	—	—
George Hiscock	Blandford school	19	—	—	—	—
Wm. Munday	Blandford school	16	—	—	—	—
Edward Paynter	Blandford school	17	—	—	—	—
R. G. White	Southampton school	—	—	—	—	—
Alfred Harrindaile	Southampton school	—	—	—	—	—
Frederick King	Warminster school	19	—	—	—	—
Henry Trapp	Warminster school	14	—	—	—	—
Sarah Chandler	Romsey school	18	—	—	—	—
Henry Hackwood	Romsey school	16	—	—	—	—
Charles Baker	West Lavington school	—	—	—	—	—
Samuel Flint	Stockcross school	16	—	—	—	—

JUNIOR CANDIDATES.

Number of Candidates Examined 199 | Number of Candidates Passed 85

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.				
			Arith- metic.	Gospel History.	English History.	Geography of England.	Plain Needle- work.
Abner Hunt	Vernham school	18	—	—	—	—	—
George Stroud	Vernham school	15	—	—	—	—	—
W. H. Darley	Alton school	14	—	—	—	—	—
Charles Beazley	Alton school	14	—	—	—	—	—
George Light	Millbrook school	13	—	—	—	—	—
William Pike	Millbrook school	18	—	—	—	—	—
Harry Cull	Millbrook school	15	—	—	—	—	—
Isaac Husen	Chute school	18	—	—	—	—	—
Robert Cooke	Chute school	22	—	—	—	—	—
Peter Webb	Chute school	16	—	—	—	—	—
Charles Pays	Chute school	12	—	—	—	—	—
Edward Potter	Market Lavington school ..	20	—	—	—	—	—
Walter Smith	Market Lavington school ..	17	—	—	—	—	—
Charles Matthews	Market Lavington school ..	18	—	—	—	—	—
Frederick Long	Derry Hill school	13	—	—	—	—	—
Emmanuel Long	Derry Hill school	13	—	—	—	—	—
Jesse Page	Westmean school	15	—	—	—	—	—
James Simpson	Westmean school	13	—	—	—	—	—
Henry Hodges	Westmean school	13	—	—	—	—	—

SOUTHERN COUNTIES ADULT EDUCATIONAL SOCIETY.

JUNIOR CANDIDATES (*Continued*).

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.				
			Arith- metic.	Gospel History.	English History.	Geography of England.	Plain Needle- work.
James Ford	Westmean school	13	—	—	—	—	—
Thomas Welch	Westmean school	15	—	—	—	—	—
Henry Fudge	Lyme school	12	—	—	—	—	—
George Swaffield	Lyme school	12	—	—	—	—	—
Frederick Radford	Lyme school	13	—	—	—	—	—
William Burt	Preston school	15	—	—	—	—	—
James J. Croad	Preston school	15	—	—	—	—	—
J. K. B. Fooks	Preston school	14	—	—	—	—	—
Job Savage	Old Basing school	16	—	—	—	—	—
Thomas Vickery	Old Basing school	14	—	—	—	—	—
William Brooker	Old Basing school	13	—	—	—	—	—
George Hicks	Fordingbridge school	19	—	—	—	—	—
Charles Arney	Fordingbridge school	13	—	—	—	—	—
Arthur Hildarons	Wellow school	15	—	—	—	—	—
Elizabeth Sergeant	Wellow school	14	—	—	—	—	—
Samuel Stingo	Wellow school	13	—	—	—	—	—
Alfred Grey	Swanage school	14	—	—	—	—	—
Charles Fanode	Swanage school	13	—	—	—	—	—
Charles Pike	Stockcross school	15	—	—	—	—	—
Tom Wicks	Stockcross school	16	—	—	—	—	—
John Leroe	Wilton Institution	14	—	—	—	—	—
Frederick Brazier	Wilton Institution	16	—	—	—	—	—
Henry Payne	Wilton Institution	14	—	—	—	—	—
George Bowles	Wilton Institution	14	—	—	—	—	—
John Beckett	Wilton Institution	14	—	—	—	—	—
Albert Musselwhite	Wilton Institution	12	—	—	—	—	—
James Jeanes	Blandford school	14	—	—	—	—	—
Thomas Butt	Blandford school	17	—	—	—	—	—
John Meech	Blandford school	14	—	—	—	—	—
Frank Squibb	Blandford school	16	—	—	—	—	—
John Domoney	Blandford school	16	—	—	—	—	—
Edward Derham	Blandford school	13	—	—	—	—	—
Henry Archer	Blandford school	14	—	—	—	—	—
George Durrant	Buckland Newton school ..	15	—	—	—	—	—
Lucy Mary Theny	Buckland Newton school ..	13	—	—	—	—	—
Charles Andry	Marlborough school	13	—	—	—	—	—
Alfred Chapman	Marlborough school	14	—	—	—	—	—
Francis Page	Marlborough school	13	—	—	—	—	—
George Wyatt	Marlborough school	13	—	—	—	—	—
Sydney Harding	Marlborough school	13	—	—	—	—	—
James Greenslade	Marlborough school	14	—	—	—	—	—
William Pearce	Marlborough school	14	—	—	—	—	—
William Mead	Abbotts Ann school ..	13	—	—	—	—	—
William Chevis	Abbotts Ann school	14	—	—	—	—	—
William Smith	Abbotts Ann school	13	—	—	—	—	—
Martha Weeks	Abbotts Ann school	13	—	—	—	—	—
R. Hutchins	Penton school	15	—	—	—	—	—
Edwin Bird	Warminster school	14	—	—	—	—	—
George Hinton	Warminster school	14	—	—	—	—	—
Matthew Gough	Warminster school	16	—	—	—	—	—
Charles Meaden	Warminster school	15	—	—	—	—	—
George Bulcher	Warminster school	25	—	—	—	—	—
Charles Ledbury	Warminster school	12	—	—	—	—	—
Henry Orchard	Warminster school	14	—	—	—	—	—
George Bird	Warminster school	12	—	—	—	—	—
George Stevens	Warminster school	12	—	—	—	—	—
William Burgess	Warminster school	14	—	—	—	—	—
Tom Turner	Warminster school	13	—	—	—	—	—
Sylvester Saywell	Warminster school	14	—	—	—	—	—
Charles Dyer	Warminster school	15	—	—	—	—	—
Frank Butt	Warminster school	16	—	—	—	—	—
William King	Warminster school ..	14	—	—	—	—	—
Emily West	Romsey school	16	—	—	—	—	—
Alice Major	Romsey school	16	—	—	—	—	—
Mary Cannall	Romsey school	14	—	—	—	—	—
John Debenham	Kingsley school	17	—	—	—	—	—

WEST RIDING (YORKS) EDUCATIONAL BOARD.

SENIOR CANDIDATES.

Number of Candidates Examined 48 | Number of Candidates Passed 29

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.			
			Arithmetic.	Geography and English History.	St. Matthew and Acts.	Needlework.
Hartley Robinson.....	Wilsden Mechanics' Institution.....		—	—	—	
Samuel Wright		17	—	—	—	
Zaccheus Wright.....	Thirsk Mechanics' Institution	17	—	—	—	
Alex. Campbell Dixon...		18	—	—	—	
Henry Cox	Marske Mutual Improvement Society.....	17	—	—	—	
Joseph Metcalfe		14	—	—	—	
Joseph Parker		13	—	—	—	
William Clayton.....		29	—	—	—	
Sarah Bel Sanderson ...		14	—	—	—	
Thomas Forrest		13	—	—	—	
John William Longley..		13	—	—	—	
Lancelot Gale		13	—	—	—	
Nathan Alex. Mackie...		12	—	—	—	
John Nelson Firth		11	—	—	—	
Joseph Edward Oldroyd.		14	—	—	—	
George Henry Robinson.		13	—	—	—	
Charles Henry Harral...		13	—	—	—	
Wm. Preston Wildman.		15	—	—	—	
James Windsor		12	—	—	—	
Frank Preston Wildman.		13	—	—	—	
John Schofield Shaw ...		12	—	—	—	
Charles Burdett Ogden..		15	—	—	—	
Arthur Andrew		14	—	—	—	
Wesley North		15	—	—	—	
Sarah Ann Gaunt.....		17	—	—	—	
Apulina Gaunt.....		17	—	—	—	
Fanny Ardill		17	—	—	—	
Carolyn Horner		13	—	—	—	
William Medd	Leeds Mechanics' Institution.		—	—	—	

JUNIOR CANDIDATES.

Number of Candidates Examined 69 | Number of Candidates Passed 50

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.				
			Arithmetic.	Gospel History.	English History.	Geography of England.	Plain Needlework.
Jonathan Wright.....	{ Wilsden Mechanics' Institution		—		—	—	
William Lynas		15	—	—	—	—	
James Fildes Pearson ...		9	—	—	—	—	
Henry Burn Clough ...		12	—	—	—	—	
Henry Bowes		13	—	—	—	—	
Charles Britton.....		11	—	—	—	—	
Arnold Joshua Mello ...		13	—	—	—	—	
John Wild		14	—	—	—	—	
William Bosomworth ...		14	—	—	—	—	
William Clayton.....		15	—	—	—	—	
John Edward Ward.....		16	—	—	—	—	
Jonathan Hepworth.....		18	—	—	—	—	
Wright Garlick		16	—	—	—	—	
George Webb		15	—	—	—	—	
Charles Pearson		24	—	—	—	—	
John Bennett		14	—	—	—	—	
John William Davison..		11	—	—	—	—	
John Clark Jefferson ...		14	—	—	—	—	
Harry Roberts		10	—	—	—	—	
William Sunderland ...		13	—	—	—	—	
Robert Edwin Peacock }		12	—	—	—	—	
Craven		12	—	—	—	—	
John Ald. Dale Telford.			—	—	—	—	
Frank William Lee.....			—	—	—	—	

WEST RIDING (YORKS) EDUCATIONAL BOARD.

JUNIOR CANDIDATES (*Continued*).

NAMES OF CANDIDATES.	PARISH OR INSTITUTION.	AGE.	SUBJECTS IN WHICH EACH CANDIDATE HAS PASSED.				
			Arith- metic.	Gospel History.	English History.	Geography of England.	Plain Needle- work.
Charles Herbert Nelson.	Leeds Mechanics' Institu- tion	12	—	—	—	—	—
Wm. Sowry Thornton...		13	—	—	—	—	—
Thomas Harrison.....		13	—	—	—	—	—
Thomas Henry Fearnley.		14	—	—	—	—	—
John Wm. Hainsworth..		12	—	—	—	—	—
James Walter Ladley ...		12	—	—	—	—	—
John Henry Tyas		12	—	—	—	—	—
Joseph Dyson		11	—	—	—	—	—
William Cameron		13	—	—	—	—	—
James Bowman		11	—	—	—	—	—
James Thompson.....		11	—	—	—	—	—
William Smith		12	—	—	—	—	—
Arthur Wilkinson		10	—	—	—	—	—
William Harrel		12	—	—	—	—	—
Alfred Thompson.....		10	—	—	—	—	—
George Baines		12	—	—	—	—	—
John Burrow		10	—	—	—	—	—
Jackson Broomhead.....		12	—	—	—	—	—
Anne Maclea Jackson ...		15	—	—	—	—	—
Eliza Barrett	Leeds Female Educational Institute	13	—	—	—	—	—
Mary Atkinson.....		16	—	—	—	—	—
Louisa Brambles		13	—	—	—	—	—
Emily Benson		14	—	—	—	—	—
Clara Balfour Andrew...		12	—	—	—	—	—
Elizabeth Marshall		15	—	—	—	—	—
Elizabeth Bickerdike ...		14	—	—	—	—	—
Elizabeth Ann Mann ...		13	—	—	—	—	—

EXAMINATION PAPERS, 1862.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last :—

ARITHMETIC.

THREE HOURS ALLOWED.

(No marks will be allowed for answers where the working is not shown.)

- Find the value of $5,631\frac{1}{2}$ articles at £4 14s. $2\frac{1}{2}$ d. each.
- What is the cost of carrying goods 56 miles 2 fur. 25 poles, at £1 3s. $7\frac{1}{2}$ d. per mile.
- The wages of 26 men are £32 10s. per week. What sum will be required to pay 84 men at the same rate?
- What part of a guinea-and-a-half is 15s. $6\frac{1}{2}$ d.
- If 246 cwt. 3 qrs. 24 lbs. of sugar, at £3 5s. 4d. per cwt., be exchanged for 302 qrs. 4 bush. 1 pk. of oats, what is the value of the oats per peck?
- If 12 candles, 8 to the lb., serve 4 evenings from 5 to 11 o'clock, how many candles, 6 to the lb., will serve 3 evenings from 7 to 11 o'clock.
- A, B, C, and D, who walk respectively 12, 14, 16, and 18 miles per day, start at the same hour, to travel in the same direction round an island which is 1,008 miles in circumference. When will they all meet together again at the starting point; and how many times will each have walked round the island?
- A can reap 5 acres of corn in 3 days; B can reap 7 acres in 9 days; and C can reap 11 acres in 12 days. In how many days can they together reap 121 acres?
- Find the difference in income of the transfer of £4,000 stock from the 4 per cents at 93 to the $3\frac{1}{2}$ per cents at 84.

10. Show whether it would be more advantageous to receive £5,000 ready money or £5,750 in 3 years, compound interest being reckoned at 5 per cent. per annum.

11. I bought cloth at 6s. 9d. per yard, with 3 months' credit; how must I sell it so as to gain 5 per cent., and allow 9 months' credit?

12. Three men and four boys are employed in loading a vessel with ballast. A man puts in 7 measures for a boy's 6, and 4 measures of a man's are equal to 5 of a boy's. Divide £3 7s. proportionally among them.

13. In making a railway a tunnel is to be cut through a hill whose top is 180 feet above the line, and the slant sides are 560 and 960 feet respectively. What is the length of the tunnel?

14. If 1 lb. of tea be worth $2\frac{1}{2}$ lbs. of coffee, and 1 lb. of coffee worth $3\frac{1}{2}$ lbs. of sugar, what is the value of 56 lbs. of tea, sugar being 7d. per lb.?

15. Find the expense of painting a stair of 13 steps each 2 feet 7 in. broad, 7 in. high, and 10 in. wide, at 1s. 6d. per square yard.

16. An apartment is 13 feet 10 in. high, 17 feet 3 in. long, and 15 feet 10 in. wide. What will be the expense of covering the floor with carpet $1\frac{1}{2}$ yard wide, at 3s. 4d. per yard; and the walls with paper $1\frac{1}{2}$ yard wide at $1\frac{1}{2}$ d. per yard?

17. In decimal currency, £1 being the unit, the following sums are received: £150, 1 florin, 5 cents; £490, 4 florins, 7 cents, 5 mils; £80, 8 florins, 7 cents, 5 mils; £7, 6 florins, 2 cents, 5 mils. Express the total in the present currency.

18. What quantity of coffee, at $2\frac{1}{2}$ cents. per oz., will cost £1, 9 florins, $5\frac{1}{2}$ cents?

19. What will be gained or lost per cent. by paying 10½d. for that whole number of mils which is nearest it in value?

20. If, when the duty on tea is raised from 13d. to 16d.

per lb., the increase in the revenue is only 10 per cent., what is the decrease per cent. in the consumption?

21. In what time can 8 men finish a work which 7 boys can do in 12 hours, if 10 men and 2 boys can do as much per hour as 7 men and 10 boys?

BOOK-KEEPING BY DOUBLE ENTRY.

THREE HOURS ALLOWED.

NOTE BENE.—Candidates who reply to No. 6 need not reply to No. 4, but *satisfactory answering* in No. 6 will be deemed an indispensable condition to a high degree of excellence.

1. In what consists the distinction between the double-entry and the single-entry method?

2. Does double-entry secure the detection of all errors to which a book-keeper is liable?

NOTE.—Reasons to be stated for the answer given to this question.

3. What are the respective uses of the Journal and Ledger?

4. Write out in due technical form and language the Journal and Ledger entries of the following transactions:—

Purchased 10 pipes of wine of John Job for	£500
Accepted John Job's draft for.....	£500
Sold to Levi Og 7 pipes of wine for.....	£350
Received cash of Levi Og	£250
Received his acceptance for	90
Allowed him by way of discount	10
	£350

5. What should a profit and loss account and a balance sheet severally exhibit?

6. Journalise and post in due technical form and language the following supposititious transactions, and draw out from the Ledger—a trial balance, a profit and loss account, and a balance-sheet:—

On the 1st January, 1862, John Foster found the state of his affairs to be as follows:—

LIABILITIES.

Amount due to Henry Thomson, £600	
John Foster's own acceptance, due 15th January	£400

ASSETS.

20 pipes of wine, valued at	£2,000
Cash in hand.....	500
J. Cox's acceptance, due 20th Jan....	1,200
Outstanding shipment of wine to Ceylon	300

Transactions subsequently to 1st Jan. 1862.

1862.		
Jan. 2.	Sold to J. Wilks 1 pipe of wine ...	£120
"	Cash received of J. Sands:—Loan at 5 per cent. per annum	500
"	3. Sold to S. Box, 2 pipes of wine ...	260
"	4. Purchased of R. Brown (ex. duty) 1 pipe of wine	102
"	5. Cash paid, duty on ditto	30
"	7. " received of S. Box on account	100
"	Sold to N. James 4 pipes of wine...	500
"	Received of N. James, his acceptance due 10th March	500
"	8. Cash received of J. Wilks	117 10 0
"	Discount allowed to ditto	2 10 0
"	10. Sold to W. Nix 10 pipes of wine...	1,400

"	Received of W. Nix his acceptance, due 13th April	1,400
"	11. Discounted with O. G. & Co., N. James's acceptance due 10th Mar.	500
"	Received from O. G. & Co., cash	495 10 0
"	Discount charged by O. G. & Co....	4 10 0
"	12. Sold to B. How 2 pipes of wine ...	175
"	Cash paid for stationery	3 10 0
"	13. Received final account of sales of consignment to Ceylon; net proceeds to be accounted for by Abel & Co., of Ceylon.....	220
"	14. Purchased and paid for in cash, 5 pipes of wine	460
"	15. Cash paid, my acceptance due this day	400
"	16. Sold to E. Jones 3 pipes of wine...	350
"	17. Cash paid to H. Thomson, on account	300
"	18. Purchased of Tom Brown, 8 pipes of wine	720
"	19. Cash paid to ditto on account	500
"	20. Cash received of E. Jones on account	100
"	21. J. Cox's acceptance due 20th inst., returned dishonoured and noted; noting 1s. 6d.	1,200 1 6
"	22. Cash received of J. Cox on account of dishonoured bill	800
"	Accepted Tom Brown's draft, due 25th April	220
"	25. Bought, and paid for in cash, 7 pipes of wine	560
"	31. Cash paid, one month's salary to clerk.....	20
"	Interest on capital one month	8 6 8
"	Interest charged to J. Cox on his returned bill	1 13 4
"	Interest due to J. Sands, on loan...	1 19 9
"	Cash drawn out by J. Foster, on private account	50
"	Rent due to W. Rix, one month...	15
"	Due to S. Low, for stationery	2 10 0
"	Stock of wine on hand this day, 19 pipes	1,600

ALGEBRA.

THREE HOURS ALLOWED

A

1. Divide $x^5 - \frac{1}{x^5}$ by $x - \frac{1}{x}$

2. Multiply $\sqrt[4]{29 + 4\sqrt{30}}$ by $\sqrt{29 - 4\sqrt{30}}$

3. Find the greatest common measure and least common multiple of $6a^2 + 7ax - 3x^2$ and $6a^2 + 11ax + 3x^2$.

4. Determine the relations between a, b, c , when $ax^2 + 2bx + c$ is a perfect square, and between a, b, c, d , when $ax^3 + 3bx^2 + 3cx + d$ is a perfect cube.

5. Solve the equation $a + x + \sqrt{2ax + x^2} = b$

6. Solve the simultaneous equations:—

$$\begin{cases} 3x + 5z = 68 \\ 4x + 7y = 163 \\ 2y - 2z = 3 \end{cases}$$

7. If a is greater than b , and c greater than d , prove $\frac{a+b}{c+d}$ will be intermediate between $\frac{a}{c}$ and $\frac{b}{d}$ for all values of x .

8. If A, B, C, D, are four successive points in the same right line, prove algebraically that $AD \times BC + AB \times CD = AC \times BD$.

B.

9. If a , b , c , are in harmonical progression (that is to say are the reciprocals of three other quantities in arithmetical progression) prove that b^2 is greater than the mean between a^2 and c^2 .

10. Extract the square root of $1 - x$, as far as the 5th power of x inclusive.

11. Solve the equations—

$$\begin{cases} x^2 - y^2 = 2xy \\ x^3 + y^3 = 3 \end{cases}$$

And the equation $\frac{2x + \sqrt{2(1+x)}}{1-x} = c + \frac{1}{c}$

12. Insert between 6 and 24 two quantities x , y , so that 6, x , y , 24 shall form a harmonic progression.

13. The hold of a vessel partly full of water, and into which water is leaking through at a uniform rate, is furnished with two pumps, worked by M, N. M takes 3 strokes to 2 of N's, but only throws out in five strokes as much water as N throws out in four. N works for the time in which M would have emptied the hold, and is then succeeded by M, and the hold is cleared in 8 hours. Had they worked together it would have been cleared in 2 hrs. 15 min., and M would have poured out 60 gallons more than he did. Required the quantity of water in the hold at first, and the rate per hour of the influx of water at the leak.

GEOMETRY.

THREE HOURS ALLOWED.

1. If two triangles have two sides of the one equal to two sides of the other, each to each, but the angle contained by the sides of the one greater than the angle contained by the two sides equal to them of the other, the base of that which has the greater angle shall be greater than the base of the other.

2. To a given straight line apply a parallelogram, which shall be equal to a given triangle, and have one of its angles equal to a given rectilineal angle.

3. If the squares described on two sides of a triangle be equal to the square described upon the third side, the angle subtended by that side shall be a right angle.

4. Divide a straight line into two parts, so that the rectangle contained by the whole line, and one of the parts, shall be equal to the square of the other part.

5. In an obtuse-angled triangle, the squares on the sides containing the obtuse angle are less than the square described on the side opposite to it. What is the difference? Enunciate the proposition and prove it.

6. The angles in the same segment of a circle are equal to one another.

7. Show how to bisect a given portion of the circumference, i.e., how to divide it into two equal parts.

8. Show how to inscribe an equiangular and equilateral pentagon in a given circle.

9. If two triangles have one angle of the one equal to one angle of the other, and the sides about the equal angles proportionals, the triangles shall be equiangular, and shall have those angles equal which are opposite to the homologous sides.

10. If two parallelograms have an angle equal in each, and the sides about the equal angles reciprocally proportional, the parallelograms shall be equal to one another.

11. If two planes which cut one another are each perpendicular to a third plane, their intersection is perpendicular to it.

12. Segments of right lines intercepted between parallel planes are proportional.

PROBLEMS.

1. If the points of bisection of the sides of any quadrilateral be joined, the figure so formed is a parallelogram.

2. Bisect a triangle by a line drawn through a given point outside the triangle.

3. If the vertical angle of a triangle be equal to the angle of an equilateral triangle, the square of the base is less than the sum of the squares of the sides, by the rectangle under them.

4. The three circles circumscribing the three equilateral triangles, constructed on the sides of any triangle, meet in a point.

5. A flag-staff of a given height is erected on a tower whose height is also given; at what point in the horizontal plane passing through the foot of the tower, will the angle subtended by the flag-staff be the greatest possible?

6. How can it be shown, geometrically, that the diagonal and the side of a square are incommensurable?

7. The rectangle contained by the sides of any triangle is to the rectangle contained by the radii of the inscribed and circumscribed circles, as twice the perimeter is to the base.

8. Inscribe in a given circle two isosceles triangles, the area of one of which shall be one-fourth the area of the other.

9. Bisect a triangular pyramid by a plane passing through one of its angles, and cutting one of its sides in a given direction.

(To be continued.)

Home Correspondence.

LECTURES AND ENTERTAINMENTS AT MECHANICS' INSTITUTIONS.

SIR,—I venture to describe, for the information of those readers of the *Journal* who take an interest in Mechanics' Institutions and their management, a plan adopted by the directors of the "Bacup Mechanics' Institution," for insuring a successful course of lectures and entertainments during the approaching season, successful, in a pecuniary sense, and in the matter of obtaining good audiences; the latter being often as difficult of attainment as the former. I may here remark that the course is not being arranged with a view to any pecuniary advantage, though that would be acceptable, but for creating a wider interest in the Institution and its affairs.

1st. Adopting the suggestion often repeated in the *Journal* by your excellent correspondent, Mr. Blake, of the Yorkshire Union of Institutions, it is resolved that the lectures shall be given on a fixed and determinate evening in each week, in order that the public may the more easily retain the fact in their memory, and so be able, in good time, to make their other engagements accordingly.

2nd. It is decided that a lecture or entertainment (as the case may be), shall be given on the Wednesday evening in each week; extending from October 1862, to March 1863, both inclusive. During the season there will be 22 lectures and entertainments. For local reasons, on four Wednesdays in the season, no lecture or entertainment will be given.

3rd. The members of the Institution will be admitted to the whole course of lectures and entertainments free (to all except the reserved seats), on producing their tickets of membership. In addition to this privilege, each member applying to the secretary, who will be in attendance on the Monday evening preceding each lecture, &c., will be presented, gratis, with a "complimentary" ticket which will admit any one of his or her friends or acquaintances.

4th. The charge to the public, not being members of the Institution, for admission each evening, will be sixpence to the reserved seats, and twopence to the body of the hall and gallery.

5th. A number of reserved seat tickets, giving admission to the entire course, are provided, three of which are presented to every subscriber of ten shillings. As it is on the proceeds of these tickets that the directors will chiefly depend for defraying the expenses of the course, their sale will be pushed as vigorously as possible.

Sixteen nights are already occupied, and, so far as arranged, the lecturers, &c., are giving their services free of charge, travelling expenses alone being paid. Should the lecturers for the remaining six nights be obtained on like favorable terms, we estimate that the total cost of printing, with the other expenses connected with the course, will not exceed £20. Forty subscribers to the course tickets would cover that sum, and we are sanguine of obtaining them. I ought to add that we are at no expense for a room, having a large hall of our own.

Our printing will be economised as much as possible, consistent with giving publicity to the course, and will comprise:—

1st. A programme or syllabus of the whole course.

2nd. Wall slips announcing each lecture, &c.

3rd. 500 hand-bills announcing each lecture, &c.

The following is a list of subjects already arranged. In a week or two we hope to complete the programme:—
 “Jerusalem and the Holy Land,” two lectures; “An Evening with some of our English poets;” “Humorous Entertainment;” “The Chemistry of Water;” “Lancashire Poets and Poetry;” A Miscellaneous Entertainment, entitled “Music, and Magic;” “The Air we Breathe;” “Books, and how to read them;” “Humorous Entertainment;” “Combustion, and some of its phenomena;” “America, past and present;” Humorous Entertainment; “Readings from an Old Manuscript,” (a geological lecture;” “The Steam Engine;” “Lord Brougham.”

Probably some of your correspondents may be able to offer suggestions improving upon the above plan; if so they will be welcome to

Yours, &c.,

THOS. NEWBIGGING, Hon. Sec.

Bacup Mechanics' Institution.

Bacup, July 14th, 1862.

Proceedings of Institutions.

GOSPORT LITERARY INSTITUTION.—The twelfth annual meeting was held on Friday evening, the 30th May, in the reading room, at the Town Hall, J. H. Field, Esq., one of the Vice-Presidents in the chair. From the report read by the Secretary, it appeared that 273 members and subscribers were on the books of the Institution, and that after payment of all the liabilities, a balance remained in the Treasurer's hands amounting to £10 17s. 8d. The extensive additions made to the Library, with the profit realized from the “Fine Art Exhibition,” has been greatly appreciated by the members, the number of readers having been 178, and the volumes issued 3,084. The Library has been further increased during the past year by 133 volumes, making the total number of books 1,133. The scrutineers appointed at the meeting to examine the voting papers have certified that the following officers have been duly elected for the ensuing year:—Captain Purvis, R.N., J.P., President. Vice Presidents:—Dr. W. B. Baikie, R.N., John Butcher, Esq., Admiral G. C. Blake, H. D. Cunningham, Esq., R.N., J.P., T. H. Field, J. Hoskins, J. R. Kealy, E. S. Sepley, Tillston, and Henry Wharton, Esqrs. Treasurer:—James Biden, Esq. Secretary:—Mr. Walter Field. Auditors:—Messrs. B. Nicholson and W. Rowe:—Committee:—Messrs. H. W. Field, R. Humphrey, A. Hammond, G. B. Irons, A. Knight, T. King, E. Laphorn, W. Laws, J. P. Legg, C. Mumby, W. Short, W. Smith and J. Wood.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par Num.	
179.	„ New Zealand.
189.	„ Poor Relief (Ireland) (No. 2) (amended).

Delivered on 3rd July, 1862.

317. Royal Commissions—Return.

356. Sheriffs—Return.

366. Public Statues, &c. (London)—Return.

344 (1.) Thames Embankment Bill—Map.

303. Finance Accounts—Classes 1 to 7.

321. Poor Relief—Second Report from Committee.

Delivered on 4th July, 1862.

359. Phoenix Park—Return.

182. Bills—Public Houses (Scotland)—Lords Amendments.

183. „ Leases, &c., by Incumbents Restriction Act Amendment.

184. „ Turnpike Acts Continuance.

185. „ Turnpike Trusts Arrangement.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, July 4th, 1862.]

Dated 24th June, 1862.

1852. T. Desgrandschamps, 71, Rue de Charenton, Paris—A new mechanism of distribution with motion from the rod, applicable to any kind of steam engine.

1854. W. Bayliss, Monmore-green, Wolverhampton—An improved strainer for straining and tightening wire for fencing and other purposes.

1856. G. Gray, Greenwich—Imp. in the manufacture of wheels.

1858. W. Clark, 53, Chancery-lane—Imp. in hernial and other orthopedic apparatus, and in pessaries and other instruments. (A com.)

Dated 25th June, 1862.

1860. S. Brooks, Manchester, and S. Denton, Oldham—Imp. in machinery for spinning and doubling.

1862. W. Clark, 53, Chancery-lane—Imp. in ploughs. (A com.)

1866. C. C. Steenstruf, Horten, Norway—An improved economical can or vessel for containing and delivering lubricating or other fluids.

1870. J. David, 20, Rue St. Fiacre, Paris—An improved dynamometer for ascertaining the relative strength and elasticity of various kinds of threads and ropes.

1872. W. Clark, 53, Chancery-lane—Imp. in apparatus for raising the nap on cloth and other fabrics. (A com.)

Dated 26th June, 1862.

1874. G. Peterson, Brompton-square—Imp. in apparatus for ascertaining the quality and strength of spirits or other products obtained by the process of distillation. (A com.)

1876. J. Parkes, London-street, Paddington—Imp. in gas lanterns.

[From Gazette, July 11th, 1862.]

Dated 14th April, 1862.

1072. J. Childs, Victoria street, Pimlico—Imp. in the manufacture of wax matches.

Dated 22nd May, 1862.

1553. G. F. Goransson, Gefle, Sweden—Imp. in the construction and arrangement of armour plates, applicable to ships, forts, batteries, and other structures, and to a mode of securing the same.

Dated 30th May, 1862.

1625. P. U. Payras, 15, Passage des Petites Ecuries, Paris—Imp. in protecting dry or green hides from vermin.

1626. J. Guerin, Stroud, Gloucestershire—A new mode of telegraphic communication between separate buildings or parts of buildings.

Dated 4th June, 1862.

1679. C. S. Cahill, 9, Gerrard street, River-terrace, Islington—Imp. in the manufacture of felted fabrics suitable for hats, bonnets, and other purposes.

Dated 9th June, 1862.

1717. E. Hotin, 26, Rue de Rivoli, Paris—A composition for rendering unflammable linen, flax, silk, cotton, woodwork, and other articles or materials.

1722. A. J. Joyce, Cambridge-terrace—Imp. in lighting and heating.

Dated 12th June, 1862.

1747. I. Spight, Glandford Briggs, Lincolnshire—Imp. in horse hoes.

1749. A. A. Lerenard, 60, Boulevard de Strasbourg, Paris—A new and improved cement or mastic for making joints of steam, water, or gas pipes or chambers.

1753. B. George, Kingsland-road—Imp. in the construction of portable beds, bolsters, pillows, and sofa and other cushions.

Dated 13th June, 1862.

1755. W. Smith, 48, Briggate, Leeds—Imp. in apparatus for cutting or dividing soap.

1757. A. Longbottom, Hammersmith—Imp. in the manufacture of artificial stone.

1759. J. H. Glew, Howland-street, Fitzroy-square—Imp. in sewing machines.

1761. T. W. Fleming, 10, Lancaster-gate, Bayswater—Imp. in preparing charges for fire-arms.

1763. W. E. Newton, 66, Chancery-lane—Imp. in fire arms, and in the attachment of bayonets or swords thereto. (A com.)

1765. J. Ives, Bow—Improved apparatus for expressing juice from fruit and other vegetable substances.

Dated 14th June, 1862.

1769. J. Sawyer, Noble-street, and G. Padgham, Dalston—Imp. in steam boiler and other furnaces, applicable in part to grates of various kinds.

1773. W. Bouch, Shildon, Durham—Imp. in cranes.

1775. W. Wighton, Edinburgh—Imp. in apparatus for regulating watches and other time keepers.

Dated 17th June, 1862.

1796. J. Kellow and H. Short, Delabole, Cornwall—Imp. in the manufacture of blasting powder.

Dated 19th June, 1862.

1805. A. Howat, Farnworth, near Bolton-le-Moors, Lancashire—Imp. in the construction of water gauges and blow-off taps for steam boilers and other purposes.

1807. W. Stokes, C. W. James, and J. Stokes, Birmingham—New or improved machinery for stocking and screwing guns and pistols.

1809. C. Cartwright, 1, Liverpool-street, Moorfields—Improved means of stopping or retarding trains on railways.

1811. E. J. Davis, West Smithfield—Imp. in treating and preparing food for horses and other animals.

1813. W. Thomson, Thorney, near Peterborough—Imp. in machinery for making bricks, tiles, and other articles.

Dated 20th June, 1862.

1815. J. G. Dupuch, Paris—Imp. in cocks for regulating the supply of gas.

1817. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the manufacture of candlesticks, and in machinery or apparatus used in such manufacture. (A com.)

1818. J. Bedford, Paris, 52, Rue Charlot—Imp. in the irons and cutters of planes, and in the method of manufacturing the same. (A com.)

1819. W. Malins, Pershore—An improved protective covering for agricultural or other similar purposes.

1821. B. M. Mody, 4, Trafalgar-square—Imp. in varnish or polish.

1822. J. W. Taylor, Newsome, near Huddersfield—Imp. in valves, and in means for regulating and indicating the flow and pressure of fluids.

1823. D. Middleton, Burton-by-Lincoln, Lincolnshire—Imp. in cranes for lifting weights into and out of carts, and for other purposes.

1825. A. Warner, Threadneedle-street—Imp. in the manufacture of pigments or paints from certain refuse materials.

Dated 21st June, 1862.

1831. G. Simpson, Glasgow—Imp. in machinery for working, boring, and mining or excavating tools, and mining and other pumps.

1832. H. Davenport and J. Davenport, Bradford—Imp. in means or apparatus for the manufacture of loom healds or harness.

1833. J. Anderton, Accrington, Lancashire—Certain imp. applied to the tape-leg or sizing machine, and in the apparatus employed therein, for the purpose of improving the yarn.

1834. S. Holman, 18, Cannon-street—Imp. in pumps and valves.

1837. J. H. Redstone, 481, New Oxford-street—Imp. in the construction of boilers of steam-engines. (Partly a com.)

1841. E. Edmonds, Berryfield, Wiltshire—Imp. in the manufacture of felted articles and fabrics, and in the apparatus employed therein. (Partly a com.)

Dated 23rd June, 1862.

1843. H. McKenzie and P. Ramsay, Glasgow—Imp. in cylindrical or circular brushes or rollers for various manufacturing machines.

1844. H. Ponsonby, Liverpool—Imp. in top sail sheet bits or bolts.

1847. W. Barr, Coventry—An improved manufacture of raised or brocaded fabrics woven in cotton or flax, either alone or in combination with wool.

Dated 24th June, 1862.

1849. A. Ripley, Brook-street, West-square, Lambeth—Imp. in the construction of damper governors or regulators.

1850. W. Hargreaves and G. H. Leather, Bradford—Imp. in machinery or apparatus for combing wool, hair, silk, cotton, flax, and other fibrous substances.

1851. T. Carr, New Ferry, Chester—An improved machine for grinding, kneading, washing, and other like purposes.

1853. G. Collier, Halifax, and J. W. Crossley, Brighouse—Imp. in means or apparatus for hot pressing, which imp. are also applicable to other heating purposes.

1857. E. C. Nicholson, Atlas Works, Locksfields, Surrey—Imp. in the preparation of colouring matters applicable to dyeing and printing.

Dated 25th June, 1862.

1859. M. A. F. Mennons, 24, Rue du Mont Thabor, Paris—Imp. in steam boiler furnaces. (A com.)

1861. J. Blair, Manchester—Imp. in the manufacture of wadding.

1863. G. Haseltine, 100, Fleet-street—Imp. in vaporising lamps, for burning petroleum or coal oil. (A com.)

1864. F. Tolhausen, 17, Rue du Faubourg, Montmartre, Paris—An improved lock or locking apparatus. (A com.)

1867. E. H. Huch, Brunswick, and F. J. Windhausen, Duderstadt, Hanover—Imp. in calorific engines named "fire-air engines."

1869. G. Turner, 13, Rose-terrace, Brompton—Imp. in mining apparatus, such imp. being also applicable to machines for grinding coffee and spices.

1871. W. Clark, 53, Chancery-lane—An improved frame for holding photographic pictures. (A com.)

Dated June 27th, 1862.

1884. E. Hunt and H. D. Pochin, Salford—An improved condensing apparatus.

1886. J. Lord, Tadmorden, Yorkshire, and J. Brown, Burnley, Lancashire—Certain imp. in power looms for weaving.

1888. R. A. Brooman, 166, Fleet-street—A method or methods of preparing paper for the reception of photographic pictures or impressions, in order that the said pictures or impressions may be transferred to and fixed on wood, porcelain, and other surfaces. (A com.)

Dated 28th June, 1862.

1898. Lieut. J. Gardiner, R.E., Devonport—Imp. in ordnance and in projectiles.

1904. N. Thompson, 15, Abbey-gardens, St. John's wood—Imp. in apparatus for stopping bottles, jars, and other vessels, and in instruments for applying and removing such stopping apparatus.

Dated 1st July, 1862.

1914. J. Parkinson, Bury, and J. Marsland, Newchurch—Imp. in apparatus for regulating the flow and pressure of steam and other fluids.

1916. E. Pourpoint, 15, Passage des Petites Ecuries, Paris—An improved wool washing machine.

1918. C. Lungley, Deptford, Kent—Imp. in constructing, building, and working floating docks and other floating bodies, and in pumping apparatus to be employed therein.

1922. J. M. Dunlop, Manchester—Imp. in cotton gins.

Dated 2nd July, 1862.

1926. J. James, Newport, Monmouthshire—An improved mode of welding railway crossings.

1928. B. Johnson, Chester—Imp. in rope wheels for mines, collieries, and other similar purposes.

1932. J. Steel, Stirling, N.B.—Imp. in waterclosets.

1934. J. Webster, Birmingham—Improved apparatus for the manufacture of gas for illumination.

1936. J. M. Hetherington, Manchester, and T. Jackson, Stockport—Imp. in machinery or apparatus for preparing, spinning, and doubling cotton and other fibrous materials.

Dated 3rd July, 1862.

1938. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in the construction of mechanical horses. (A com.)

1940. W. M. Williams, Handsworth, Staffordshire—Imp. in apparatus for the distillation of coal and peat, and such other substances as are or may be used for the manufacture of solid and liquid volatile hydro-carbons.

1942. T. O. Dixon, Steeton, Yorkshire—Imp. in means or apparatus for heating or warming rooms or buildings with steam, and in carrying off the condensed steam or water therefrom.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

1967. O. W. Child, New York—A new and useful composition to be used in shaft journal boxes. (A com.)—8th July, 1862.

PATENTS SEALED.

[From Gazette, July 11th, 1862.]

July 11th.	161. M. Henry.
107. S. W. Marsh.	218. M. A. F. Mennons.
108. T. Harrison and J. G. Harrison.	281. M. A. F. Mennons.
109. C. Hill.	573. P. Remond.
115. J. Ridesdale.	635. F. R. Newton and H. Codd.
116. H. D. P. Cunningham.	818. M. A. F. Mennons.
	1070. J. Dargue.

[From Gazette, July 15th, 1862.]

July 15th.	172. J. Wallace.
119. E. H. C. Monckton.	174. W. H. Ropes.
130. J. Tow.	220. A. H. Church.
135. J. J. Stevens.	270. L. Fauvel.
137. S. Dreyfous.	287. W. E. Newton.
139. T. Roberts and J. Dale.	304. H. Ashworth.
143. T. W. Jobling.	318. E. T. Bellhouse and W. J. Dorning.
145. A. Lamb and J. White.	386. J. F. Lawton & J. Lawton.
146. J. Bird.	644. A. C. MacLeod.
149. R. O. Doremus and B. L. Budd.	697. W. E. Newton.
153. C. Binks.	928. A. V. Newton.
157. J. H. Rawlins.	1028. G. D. Mertens.
164. I. Roberts.	1439. G. Blake.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, July 15th, 1862.]

July 15th.	1652. J. Luis.
1617. W. Robinson.	1686. O. Grimshaw.
1620. W. H. Dawes.	July 11th.
1631. J. Taylor.	1654. T. Wright.
1632. T. D. Duppa.	July 12th.
July 8th.	1662. J. Taylor.
1642. J. Smith.	1668. J. Morgan.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, July 15th, 1862.]

July 9th.	1577. R. Yeates.
1566. J. H. Tuck.	1593. J. B. Pascal.
1614. W. Smith.	July 12th.
July 11th.	1608. W. C. Thurgar.
1562. J. Caldwell and J. B. A. McKinnell.	

Journal of the Society of Arts.

FRIDAY, JULY 18, 1862.

INTERNATIONAL EXHIBITION OF 1862. GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate of £452,100, have been attached to the Deed.

SEASON TICKETS.

Season Tickets may be obtained at the Society's House, on application to Mr. S. T. Davenport, Financial Officer. The prices of the tickets are as follows:—£2 10s., admitting to the International Exhibition and the Gardens of the Royal Horticultural Society every day during the remainder of the season; £1 10s., admitting to the Exhibition only, every day; and 10s., admitting to the Exhibition on shilling days only.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October.

NOTICE TO INSTITUTIONS.

A limited number of copies of a work entitled "The Iliad of Homer, faithfully translated into un-rhymed English Metre," by Francis W. Newman, Professor of Latin, University College, London, has been kindly presented by the author to the Council of the Society of Arts, for distribution amongst such Institutions in union with the Society as may desire to add this work to their Libraries.

Any Institution desiring to have a copy, should apply to the Secretary of the Society of Arts.

ON CONSTRUCTING AND MANŒUVRING SCREW STEAMERS, FOR WAR AND OTHER PURPOSES, AND THE APPLICATION OF A SCREW PROPELLER TO PREVENT FOULING.

By COMMANDER T. E. SYMONDS, R.N.

As it is well known and admitted that there are many imperfections in the present method of fitting the screw, and in manœuvring and steering screw steamers, more especially those for war purposes, it is surprising that these subjects have not received more notice. It is true that a casual remark has been made as to the necessity for "protecting the screw," and improving the steering qualities,

but, as a rule, discussion has been almost exclusively confined to the respective merits of "armour plates" and "guns," as though they were the only two things needful.

All seamen will admit that the objects I have named are not second in importance even to those two great questions; for of what comparative use is a ram or an armour-clad ship without the power of manœuvring rapidly, either to give a blow effectively or avoid that of an antagonist? and nothing more pitiable can be imagined than one of those leviathans shorn of its motive power, a helpless log on the ocean, at the mercy of the smaller vessels, her screw or rudder disabled, perhaps, by the first broad-side of an opponent half her size, or by the wreck of some mast she may have shot away in chase; for, be it remembered, a screw is as likely, or, perhaps, more likely, to be fouled by other ships' rigging and wreck than her own; and, if we are to judge from past accounts and delineations of naval actions, there must be plenty of this floating about at such times.

Although we have the highest authority for it, and common-sense dictates the necessity for rapidity and precision in manœuvring, what advance have we made in that direction to meet the requirements of the increased proportions of our ships? We find the reply in the published statements of their steering qualities. Reflect for an instant on the time and space it would occupy to turn such a ship as the *Warrior*, as now equipped, when at slow speed, and what incalculable damage might be done to her by one or more smaller shot-proof ships capable of turning twice to her once, which, having this advantage in turning, might always avoid her blow. An eminent engineer, on a very recent occasion, remarked that "it was one thing firing at a target and another at a ship constantly moving; and, therefore, as often offering an inclined plane to the shot as a vertical one. Ships," he said, "would not always accommodate you by placing themselves at right angles." Nothing can be more to the point; and, I add, no man would so "accommodate" his opponent if his ship were under perfect control, but would take the advantage manœuvring power gave him, and place her at an inclined angle with his antagonist, either to receive his fire or avoid the blow.

Now, although I admit that some of our screw steamers do manœuvre very fairly under favourable circumstances, there is not one of great length that could be moved with certainty, or anything approaching it, especially at slow speed—and it is at slow speed, I apprehend, that an action would be fought, at least a general one. It is one thing to describe a circle in a fair way and another to turn a ship short round in action. I contend that a perfect fighting ship, no matter whether armour-clad or otherwise, should have the power of turning in her own length, or nearly so, and that the steering power should be as perfect going astern as going ahead; that the propelling power, be it what it may, should be out of danger from shot or ram; and that she should be of such a draught of water as to enable her to go into any of our own harbours or docks without delay, or to stand fearlessly into an enemy's port, and occupy a position that would enable her to use her guns effectively, some means being adopted whereby the rolling would be reduced materially, a rifled or any other gun being comparatively of little use unless you have a steady battery to fire it from. The disadvantage of a heavy draught of water was constantly felt by our inshore squadrons during the old war, and has been more recently made manifest during the operations in China. With such examples before us need we hesitate to reduce it?

I am strongly of opinion that in ships, as in other machines, special tools are required for special work, if it is to be done perfectly. We must, therefore, make up our minds to throw overboard old notions, and adopt such as will meet altered circumstances, and not attempt to cram into a ship intended for operations inshore the same amount of stores and gear we should put into one intended for cruising purposes, or expect to obtain any great results under canvas from ships required to steam at high

velocity. It is very clear that some point must be conceded to obtain a special result, and I take it most are now of opinion that any attempt to effect a combination of qualities in ships of the present type will be futile. I believe that masts and sails are necessary to all classes, but only as an auxiliary in case of a breakdown, and to ease the "rolling motion;" they may be adopted without hesitation when the fouling of the screw is obviated, as I am confident it is in the form of propeller described in this paper. That keeping masts aloft eases the rolling motion is well known to practical men and those who have seen a dismayed ship in a sea way. It is obvious that no vessel without masts can roll as easily as with them (on the principle of the metronome), especially if they have fore and aft sails set with their sheets hauled flat aft, which will reduce the motion even in a calm, and is an expedient often resorted to. I therefore much doubt if ships without masts, as is contemplated, will be as efficient for general purposes as is expected, and their absence will be found very inconvenient in hoisting in and out heavy weights, fishing the anchor, &c.

At this point I consider it right to observe that Mr. Roberts was, so far as I can ascertain, the first to recognise the necessity for giving greater longitudinal strength to iron ships, and to promulgate this doctrine in his patent in 1852 (and on many public occasions), in which he compares a ship to a "beam," and that as in a beam (which increases in strength as the square of its depth, or nearly so), it was desirable to increase the sectional area of the iron in the upper part of the hull, and thus secure the utmost strength due to the whole depth of the ship's side from gunwale to bilge.

This conclusion was arrived at on noticing the weakness exhibited by iron ships of great length built at that period, the iron sides of which terminated at the deck, the top side being composed of wood of very light scantling, thus losing several feet of depth, and consequently a large proportion of strength on the upper side of the ship or beam.

Recognising the applicability of the cellular girder system to these iron ships, he next sought a mode of arranging it, by which the greatest strength could be obtained where it was most required, viz., at the top and bottom, without a corresponding increase of weight or interfering with existing arrangements.

Instead, therefore, of introducing girders under the deck, and consequently some six feet from the top of the ship or beam, as has been subsequently recommended by other authorities, he proposed to make his girders subservient to the requirements of his ship, forming them out of the cabins, saloons, coal-bunkers, and keels, as shown in the wood cuts (page 569); he likewise proposed to make the decks of iron. Thus the cabins on either side form a continuous cellular girder fore and aft the ship, the vertical parts being formed of the side of the ship and the face of the cabins, the top and bottom being composed of the iron main deck and a strong covering plate which runs fore and aft, and is connected with the upper deck or platform, the cells being formed by the divisions or bulkheads of the cabins. By this arrangement it will be seen that there would be a very great increase of longitudinal strength in the right place beyond that of a girder under the deck. Had the *Victoria* troop-ship been fitted with these girders, her bulwarks might not have been stove in on her late disastrous voyage.

Instead of making the "deck saloons" of wood or of iron in broken lengths, he proposes to make them of iron, forming a continuous girder, nearly from stem to stern, connected with the poop and fore-castle deck; this would in itself be sufficient for all practical purposes; the sides of the saloon could be made like those of the cabins, or of a "lattice girder," with advantage, and thus admit of doors, windows, &c., being introduced without weakening the structure. This latter plan has been adopted (the lattice-structure excepted) in many light-draught steamers, but has not hitherto been applied to large steamships, although

there are many instances on record, and some of no ancient date, where their presence would have been very serviceable.

Having thus disposed of the upper side of the ship (or beam), it became necessary to consider how the lower side could be formed so as to resist an amount of compression more than equivalent to the tensile strength of the upper (as wrought iron does not resist compression as well as it does tension). For this purpose, in addition to the cellular bottom, C (Figures 3 and 6, page 569), continued the whole length of the ship (and not merely in parts, as previous to his invention was done in some instances), Mr. Roberts applies two cellular keels, D D, of any required depth, one under each bilge, extending nearly the whole length of the floor; these keels, as represented in the wood cuts, are "cellular girders," which will not only give the required strength, but effectually defend the bottom plates on taking the ground, especially if fitted with timber false keels. If considered necessary, the bottom between these keels and on either side of the bilge might be lined with planking, and thus overcome the objection some entertain to iron bottoms in the event of a ship striking on rocky ground.

These keels will materially reduce rolling, and give general stability and strength to the whole fabric, especially in a longitudinal direction, making it more capable of resisting the shock produced by the ram manœuvre. They are, in fact, two huge back-bones to secure the ribs to, instead of one solid keel of plated iron, which, as is well known, is in every way weaker than one in a cellular form. Being parallel to the plane of the ship, they do not interfere with either steerage or speed, as has been proved in Mr. Tovell's ship. These cellular keels, in connection with the cellular bottom, may be adapted either for surface or internal condensation, as suggested in Mr. Roberts' specification. It will be seen, by referring to the drawing of the mid-section, Fig. 6, that the ship is divided longitudinally into three parts by iron bulkheads, which extend nearly the whole length, connecting the upper deck with the bottom, the longitudinal compartment thus formed being sub-divided by the athwartship water-tight bulkheads, and by the divisions of the cabins and coal bunkers.

I imagine that any seaman will at once perceive with what facility a ship fitted with such keels may be grounded on a favourable place, and her bottom repaired or cleaned (should no docks exist), the keels being in fact a gridiron, which may be made even more complete by slinging logs of timber under them. As the ship will remain in an upright position on these broad surfaces, no shores will be required, which, as in the case of the *Great Eastern*, might penetrate the bottom; a few spars over the side being sufficient to steady her. The risk of docking heavy ships would also be greatly reduced, the weight being distributed over a large area under each bilge, and the operation materially expedited. In engaging forts, what an advantage it would be to have a ship thus capable of grounding without danger, and fighting her guns with nearly the same facility as though afloat. It would certainly give confidence in approaching fortifications, or covering the landing of troops, and enable them to engage so as to do their work effectually at close quarters, instead of playing at long balls. Merchant vessels in taking the ground would be free from the risk of falling over, and thereby damaging their cargoes.

I contend that a light-draught ship fitted with these keels would, from the resistance they offer, have as good or better weatherly qualities than one of deeper draught without them. They are, in fact, to a ship what the two large logs are in the Pernambuco catamaran, than which there is no more weatherly craft afloat; these catamarans never roll. It is curious and instructive to remark how nearly the intuitive genius of the savage thus approaches, or, perhaps, more properly speaking, has anticipated, the deductions of science.

Light-draught gunboats and mortar vessels might

readily be sent over sea without risk, deep temporary keels being added to those already in existence, which might be removed at pleasure.

Although I believe no one can suppose for a moment that any structure would have entirely withstood the tremendous sea which broke upon the *Royal Charter*, I question whether such a method of strengthening as I have described would not have held her together long enough to have afforded some chance of escape for many who found a watery grave on that fearful night. At all events, it is worth consideration, for how many tens of thousands are there who have to incur similar risks in the future.

That some additional strength on the upper part of our iron ships is required is, I believe, admitted by many, and was recently strongly advocated at the Institution of Civil Engineers; if not apparent now in our war ships, it is likely to make itself visible if they are subjected to any severe strains either by grounding, being in heavy weather, or being used as rams.

To obtain the greatest amount of capacity consistent with strength and required speed, I advocate a mid section of elliptical form, which is maintained throughout full one-half of the length of a uniform depth (being on an even keel); the bow lines being composed of easy curves on a principle by which the best form for entering the water I have yet seen is obtained; these lines are of such a character as to avoid any considerable bending in laying on the plates, which is a process attended with great trouble and expense.

This flat elliptical floor is continued to the fore foot; thus the fore-section is made self-supporting (the heavy part of the sharp floor, as in other ships, being dispensed with); it is consequently more buoyant, and, combined with the long floor, will reduce the tendency to pitch, and will "lift" in going against a head sea. The after section is composed of convex curves sufficiently fine to deliver the water freely, but not so lean as to diminish the necessary support in that quarter, the absence of which induces a sending to one side or dropping quarterwise, which my observation teaches me is one of the causes of rolling in ships of the present build, which, having the screw in the centre, require, it is supposed, a finer and longer run for the water to close upon it. A lean after-section also produces deeper immersion aft when at high speed (or squatting as it is sometimes called), which retards considerably. This form, combined with the cellular keels before referred to, I consider best calculated to produce a steadier platform than has been obtained hitherto, and by a proper adjustment of weights will reduce rolling to a minimum; without it guns of precision are of little avail, and you may as well attempt to fire a rifle at long range from a swing as a rifled cannon from a ship rolling through an arc of 30°.

It has been well proved that increased bulk and draught has not decreased rolling as was anticipated, nor have the "bilge pieces" had much effect (except to interfere with the steerage); is it not, therefore, time to try some other means of accomplishing this object?

It may appear at first sight that the section we propose is favourable to rolling; but it is the reverse when ballasted, and provided with two keels, as has been proved in Mr. Tovell's circular section, and as may be seen any day by experiment with a barrel or cylinder, which rolls more than any other form when empty, but when ballasted and fitted with a keel, less, and is, moreover, easier in its motion from the fact of the same section being always immersed. It is for experiment to prove which is the best for speed, the circle or ellipse; we prefer the latter, and especially as it enables us to keep our engines lower.

My experience among the beautiful slavers on the coast of Africa and the best models in our yachts, more particularly those of Mr. Weld, convinces me that a light-draught, long-floored vessel is, beyond all doubt, the fastest before the wind. So far was that opinion received among the owners of slavers in the year 1840, that vessels were constructed purposely, with orders never to haul on

a wind if chased. As in sailing vessels with the sails acting in a line with the keel, so is it, I believe, in screw steamers; and for this, added to other palpable reasons, do I advocate as light a draught as possible in all war steamships, believing that it will be found in practice, that, so long as the form is good, an increased width at the water-line with decreased depth (provided the immersed area of mid section is the same) will be more readily propelled than the same area at a deeper draught with less beam. It is clear that the light-draught body is displacing water of less density, and will not throw up that tremendous wave which is observable in most deep ships at high speeds. Light-draught ships are proverbially good sea boats; the old Danish vessels, for instance, our fathers remember, and often quote, as being handy and weatherly.

A light-draught ship, whether for war or mercantile purposes, must possess decided advantages over those of heavy draught on numerous occasions, and especially when intended to operate inshore, when they may there evade them by crossing shoals or bars, and take shelter under batteries (or attack them). Merchant vessels, also, trading to the northern and other ports, having tidal or bar harbours and rivers to contend with, are liable to detention and loss by waiting for water—Amsterdam and Rotterdam traders, for example. A light-draught ship on an even keel, fitted as described, would possess immense advantage over a long-heeled vessel taking the Brill Bar, where ships often thump for hours and damage themselves aft, as the shock would be distributed over the entire length of the two cellular keels, the draught being the same fore and aft.

A reduction of even two or three feet would obviate much of the delay now often incurred in going into Portsmouth and other harbours, and reduce the risk. It would also make present dock and harbour accommodation available without incurring the enormous expense consequent on alterations, which, it appears, are necessary ere the present class of large war steamers can be accommodated readily. At all events, a reduction in draught would set at rest the many questions that have arisen as to the ultimate value, or otherwise, of Portsmouth as a port for such a class of ships, and prevent the necessity of dredging a hole for a deep-draught ship to lie in, as in the case of the *Resistance* at Chatham.

It is, however, obvious that the draught cannot be considered reduced under the present system of propulsion with one screw, so long as great speed is required, for to retain great speed it is necessary to have a screw of great diameter, which entails great draught; and I much question, even with the present draught, if the screw is sufficiently immersed in many ships to produce the best results. In some, having a smaller screw well immersed, a greater portion of duty has been observed. However, be this as it may, if one screw cannot do the work at a reduced draught of water, why not use two? I believe the principal objections to two screws are, that the chances of fouling are multiplied; that the present form of after-section, with the dead wood intervening, would not admit of sufficient diameter, and offers a great obstruction to propulsion and steerage; and, that the speed at which it would be necessary to drive screws of finer pitch would be too high. Good results have, nevertheless, been obtained in many instances, and especially in one case I am acquainted with. The vessel in question is about 90ft. long, 12ft. wide, 3ft. 3in. draught; having two screws (3-bladed), 3ft. diameter, driven by two single-cylinder engines. She often attained a speed of eleven knots, and proved herself a capital tug, performing in a manner that quite baffles any calculation that is usually applied to ascertain the power of a single-screw steamer. This vessel was steered by her screws alone, either going ahead or astern, in the most perfect manner, turning easily and quickly in her own length. Steamers with two screws are largely and successfully employed as tugs in America, and some of the best French gunboats are also fitted with

them. Why should they not be here? I am aware that bad results have been obtained in several vessels fitted with two screws, but failure is as often caused by a wrong application of a principle as by any defect in it. In the form and arrangement I advocate, the obstruction due to the present form of vessel being entirely removed, the conditions are altered.

Encouraged by results that have already been attained by steamers with two screws, I have less hesitation in advocating the use of them on this occasion, especially as by the peculiar method in which we propose to apply them, most of the objections referred to are obviated, the screws we submit being of a form that will entirely prevent fouling; the obstruction of the "dead wood," after stern-post, and rudder being removed, we are at liberty to increase the diameter, and still have free space for them to work in, the water having undisturbed access from every direction. The rudders are so placed as to improve the steering power without interfering with the screws, rudders and screws being constantly submerged at such a depth as to defend them from shot, prevent their being lifted out of the water, or injured by the ram manœuvre.

Previously to describing this arrangement, I will consider the inconvenience arising from the present method of fitting the propeller, which is well known to be constantly liable to foul, and, therefore, specially inapplicable to war purposes, in which delay is defeat.

The numerous plans that have been suggested as a remedy prove the importance of this question. "Guard bars," "knives on the boss," and a variety of other expedients equally inefficient (which only aggravate the evil), have been laid aside, and still accidents, of a more or less fatal character, are constantly occurring. It was only the other day that one man's life was sacrificed, and that of many others in jeopardy, by the hawser attached to the *Great Eastern* fouling the screw, and in an instant capsizing and smashing a large man-of-war's boat, and precipitating her crew into a tide-race, at Milford Haven.

The frequent accidents and detentions from the same cause are now patent to all; I shall, therefore, not recapitulate them, but proceed to other objections of an equally important character.

The screw is in most instances so near the surface that it must catch every floating object within its influence; and being lifted out of the water by the slightest pitching motion, and often bared by the undulation of the wave, it loses a large proportion of its effect; and if not fitted with a good governor, the engines are liable to be strained by "racing," which may be attended with serious results in such engines as are now fitted to our large class steamers, and often causes a fracture of the blade on re-entering the water after acquiring a high velocity. Being thus near the surface, the screw is likewise liable to injury from shot, and I take it that it would be the target for the first broadside, for once crippled in that quarter, the ship would be at the mercy of her opponent. Again, being within a few inches of the bottom, it is liable to be broken by striking a rock or any hard substance, as in the case of the "*Defence*," at Spithead, the other day, on her trial trip.

It is fair to suppose that in going up rivers or entering the narrow seas or channels of an enemy, every means will be resorted to that ingenuity can suggest to cripple an opponent. Among others I know of no more certain means of fouling a screw of any size than mooring trains of nets, with their 4-inch warp attached to them, some feet below the surface, at various distances. They would as certainly protect the approach to a harbour from a screw steamer as anything that could be devised. Some of the skippers of our screw steamers trading coastwise are, I suspect, well aware of this fact.

Apart from this tendency to foul, both screw and rudder are entirely dependent on the after stern-post, which is liable to be bent or broken by a sea striking the exposed part of the rudder, the rudder-head being also liable to damage from the same cause, as in the "*Great Eastern*."

This may arise from a defective weld or wrong proportion in that long, unsupported bar of iron which is so costly and difficult to forge, and which, with its appurtenances, adds materially to the weight at the extremity, where all should be as light as possible. It is also liable to be bent by a blow from heavy shot or ram, or by striking the ground aft, which is by no means an improbability in a long-heeled ship, drawing 27 feet or 28 feet of water. In either case the rudder and screw-lifting frame might be jammed, the screw-shaft thrown out of centre, and the ship crippled either for sailing or steaming. The after stern-post displaces a large column of water, and together with the vacuum caused by the stern-post passing through the water, offers a considerable obstruction to speed, while the opening for the screw allows the water which would otherwise impinge on the rudder to pass through and diminish the steering power. This is sometimes felt to a considerable extent when under canvas. The after bearing of the screw being open at the upper side, is liable to catch anything falling upon it, and thus jam the shaft, as occurred not long since to one of our war steamers.

The method we propose for remedying these evils is first by using a propeller, F (Fig. 3), which by its form alone is calculated to reject or throw off all impediments, and if striking a hard surface will not receive any serious injury. This propeller may be readily applied to ships of the present type, with or without an after bearing; we prefer the latter. In this case the chances of fouling would be materially reduced, but cannot be prevented to the same extent as in a ship constructed or altered to suit it.

The vanes or blades are of wrought iron or steel secured to spiral flanges on the boss, the flanges being covered by a cycloidal casing of wrought iron; the root of the blades being long, and therefore well supported, admits of their being made thinner than those of the ordinary shape in cast metal; being thinner, they displace less water, and consequently absorb less power in turning; being of wrought iron, they are far less liable to injury, and can be readily replaced or repaired when damaged. They may be estimated at about half the weight, and one-third or one-fourth the cost of those made of gun-metal of the same diameter.

Cast-iron or cast-metal blades of this form would be far less liable to injury than those of the ordinary shape, as they would not strike a direct but a glancing blow. These blades are tapered on both the leading and after edges, and when in rotation, whether turning ahead or astern, may be said to form a cone that will throw off any passing wreck chain or cordage without fouling or injury; a coil of rope falling upon this screw would be instantly thrown off. This form of blade will also insure a more constant and equable action on the water under all circumstances, and thereby reduce vibration. It may be applied to vessels of very light draught for river purposes half immersed, as in many American river and lake steamers.

The method of attaching it to the shaft enables it to be readily shipped and unshipped, and being comparatively light, the after bearing is dispensed with, part of the after length of the screw shaft into which the short shaft of the propeller is shipped being of increased diameter, so as to give a sufficient bearing to prevent the weight of the screw wearing unduly, and to admit of being bored out to receive the short shaft attached to the propeller, which is secured by a key, gib, and cotters; by this means the screw and short shaft may be removed without disturbing the main shaft or admitting water into the ship.

It will be seen by the woodcuts that the part known as the "dead wood" in timber-built ships is dispensed with, and with it all the cumbrous and costly paraphernalia of stern-posts, screw-lifting frame, and, in fact, every forging of any consequence, thereby reducing the weight of the after extremity, and the cost of the ship. There being no aperture for the screw, the section will be stronger and lighter.

As before stated, I advocate two screws of the form and character described (any other form may, however, be ap-

plied if preferred), having three or four blades; these are fitted to cylindrical trunks, G, Fig. 3, under either quarter, which connect the keels with the counter of the ship; these trunks are the same diameter as the boss of the screws, against which they fit closely, so as to prevent anything getting between them, the rudders, H, being attached to the after extremity of the keels, but before and lower than the screws, so that both screws and rudders are quite clear of each other, and are thus capable of performing their respective functions without hindrance, both being immersed at such a depth as to place them entirely out of reach of shot or ram, and prevent their being lifted out of water. Should it be found that these rudders are too close to the screws and impede their action, they may be placed farther forward, without detriment. It will be seen that by this method of fitting the screws, the water being already displaced by the ship and trunks, it comes direct to the screw-blade and closes by its own gravity on the cycloidal boss, leaving an appreciable vacuum, whereas in the ordinary mode the boss not only displaces a large volume of water, but leaves a considerable vacuum in its wake, which will absorb power, retard speed, and, I am inclined to believe, cause vibration.

Being right and left screws, they turn in opposite directions, and, therefore, correct that deviation from a right line, either would produce separately (as is well known); thus, the helm is not required to counteract that effect; there is, consequently, less obstruction to the ship's way. By reversing either screw the ship may be turned rapidly by the screws alone to starboard or port in her own length (as with two sculls in a boat, one backing and the other pulling), and may be steered, going ahead or astern, by these screws, without any assistance from the helm, in the most accurate manner. This I have seen accomplished so perfectly, that there can be no doubt of success if they are properly fitted. The absence of the after stern-post and dead wood, combined with the reduced immersion, will materially facilitate manœuvring, there being considerably less area of resistance; and under any circumstances, whether stationary, at slow or at quick speed, a vessel thus equipped will answer her "screw" instantly, and not only take up, but retain, her position, no matter what the circumstances.

These screws, having their centres much lower than a single screw of the same calculated power, will work uniformly in water of greater density, be far less liable to accident, and, being constantly immersed, will, it is believed, give a result beyond that of a single screw of the usual character. Their size, and the speed at which they are driven, will, of course, be determined by the required speed of the ship. Moreover, both screws and rudders are in a more favourable position for working, being not only constantly immersed, but well removed from the centre of the wake where the water is broken, and there is an eddy or swirl caused by the water closing in from both sides the dead wood, which increases with increased speed.

The rudders are geared together, and worked by steam or by a wheel on deck, or in the after part of the engine-room, so that in action the engineers and helmsmen receive orders simultaneously, helm and screws acting together on the instant, helmsmen and steering apparatus being out of reach of shot. I submit that such a combined power of steering would give great advantage to a ship in action, or in narrow seas, over one with one screw, "which would go" against the helm, whichever way her bow "happened to take," whether from the force of wind or current.

In this method of fitting the screws no provision is made for lifting them, it being considered unnecessary, for, in the first place, it is not at all probable that large under-rigged ships would be allowed to depend on sails alone, particularly on special service; and if making a passage the screws could be disconnected or driven by the donkey engines at a speed to overcome friction. I question much if they would make any material difference if not driven; at all events, not much in excess of the resistance now

offered by the after stern-post and screw aperture, which must retard very considerably. In this opinion I am supported by the reports of many captains of screw steamers. In smaller vessels and gunboats these screws might (as we propose to fit them) be readily unshipped and hoisted in over a bill-board on each quarter; the passage could be thus made as a sailing vessel, and the screws easily re-shipped when necessary without docking.

As the utility of efficient gunboats of very light draught is now beyond all question, I consider this method of constructing them would be attended with many advantages, especially in ascending rivers, where they are constantly liable to ground, or defending our own coast; the keels, as before described, also giving sufficient strength and stability to make a sea voyage; but unless some very decided alteration takes place in the construction and arrangement of boiler, no considerable reduction can be made in the draught of our gun-boats, some of which have two sets of low-pressure boilers, one reaching nearly to the deck, for ordinary purposes, styled "working boilers," which, being exposed to shot, cannot and are not intended to be used in action. The other set, placed lower, but occupying greater fore and aft space, are called "fighting boilers." These, at their best, cannot generate more than sufficient steam to propel the vessel nine knots; whereas, if a suitable form of high-pressure boilers were used, fitted with a surface condenser, they would occupy even less space than the "fighting boilers," do the work more effectually, and leave the space and displacement now occupied by the working boilers for coal or any other purpose. The form of high-pressure boiler, and the method of connecting it with the uptake described hereafter, would be well adapted for this purpose. The engine would also be far lighter and more readily handled than those now in use, especially if fitted with wrought-iron framing.

That steam, at high pressure with surface condensation, must be eventually adopted in war steamers is so universally admitted by engineers, that any remarks I might offer would be superfluous, beyond the fact of Mr. Roberts having constantly urged the adoption of both in his patent, and on many public occasions.

The arrangement for the "uptake" of the furnaces, O, Fig. 3, allows one boiler to be cut off without interruption to the remainder; the cellular casing, around the funnel, will ventilate and lower the temperature of the boiler-room besides giving additional support and protection to the funnel. Instead of the stokers being between two long rows of furnaces, they stoke from opposite sides, which must necessarily improve their condition.

The coal bunkers, E, Figs. 3 and 4, on either side the boiler and engine-rooms, and athwart ships (as shown in the woodcuts), will add to the security of both, defending them from any shot that may either penetrate the armour plating or strike below it.

The plan of fitting the coal bunkers forms an important feature in the cellular system, and adds materially to the longitudinal strength, so specially requisite in light-draught ships, in which "the beam" is of decreased depth.

The coal bunkers in large ships may be filled expeditiously by means of small carriages running on a tramway, the cells being made to communicate with one another, so that the coals can be readily removed if required.

In this cellular arrangement much coal trimming will be dispensed with, as coal may be taken from any required cell of the bunker without the remainder shifting.

Although the advantages of this principle have been generally admitted, it has been only partially adopted in some instances, but never carried out in its integrity.

The surface condensers are in two sets; as proposed in the specification, they are constructed and arranged in a series of cylinders, either of which may be removed for cleaning or repair without impeding the action of the remainder.

I propose to have four masts, so disposed that the ship may be manœuvred without head-sails on a bowsprit, as I

consider that appurtenance not only superfluous, but ill adapted for war purposes, especially if used as a ram.

As it is of the utmost importance that every contrivance should be resorted to that may reduce weight, economise

creased armament, "labour-saving machinery" must be adopted.

The woodcuts represent plans and sections of a light-draught coast defence ship, of about 2,300 tons; length 240 feet, breadth 45 feet, draught 15 feet, mounting 14 guns, 8 feet 6 in. above the water.*

Fig. 1 is a general exterior view, showing a proposed method of protecting the guns by inclined armour-plated sides, rounded from the deck upwards, terminating in a rounded platform or deck; the top sides fore and aft being fitted to lower when bow or stern guns are used.

Fig. 2, deck plan, showing a method of giving ventilation and light, relieving the gun-deck from smoke by a strong iron grating, R, in which are hatchways for giving access to the deck, for boarding or repelling boarders.

SS are other hatchways, similarly fitted for ventilation and access to other parts of the ship.

Fig. 3, longitudinal section, showing internal arrangements.

T. Bread and dry provision room.

K. Engine room.

E. Athwart ship coal-bunkers.

N. High-pressure cylindrical boiler, with method of fitting the uptake to funnel, and the cellular casing round the funnel to give ventilation in the boiler room—same arrangement round masts to ventilate between decks. The funnel is telescopic; when run down projects only three feet above the deck in action, and is protected, the draught being given by the apparatus described, which also prevents smoke.

U. The magazines.

W. Windlass, described previously.

X. Form of stem for receiving the prow of ram, and method of strengthening the bows to resist the shock, being a series of short decks or breast hooks.

Fig. 4. Arrangement of longitudinal bulkheads, forming cellular girder, with the side applied as coal bunkers, water tanks, and other purposes.

Fig. 5. Stern view, showing propellers, and three stern chase guns, with gunwale lowered on starboard side.

Fig. 6. Section in engine room, showing proposed arrangement of engines, K; coal bunker, E; with cellular bottom and keels, C, D.

This vessel is intended for the defence of harbours, or to cross the Channel if required, being quite capable of taking the sea, and may be rigged either as a schooner or polacca. She is fitted to act as a ram, and, from the great longitudinal strength imparted by the peculiar mode of construction described, is, I conceive, specially adapted for that purpose; as also from the fact of the two screws giving her the power of *turning in her own length*, and, being steered by them, going ahead or astern without assistance from the rudders; in fact, under steam the rudders are unnecessary.

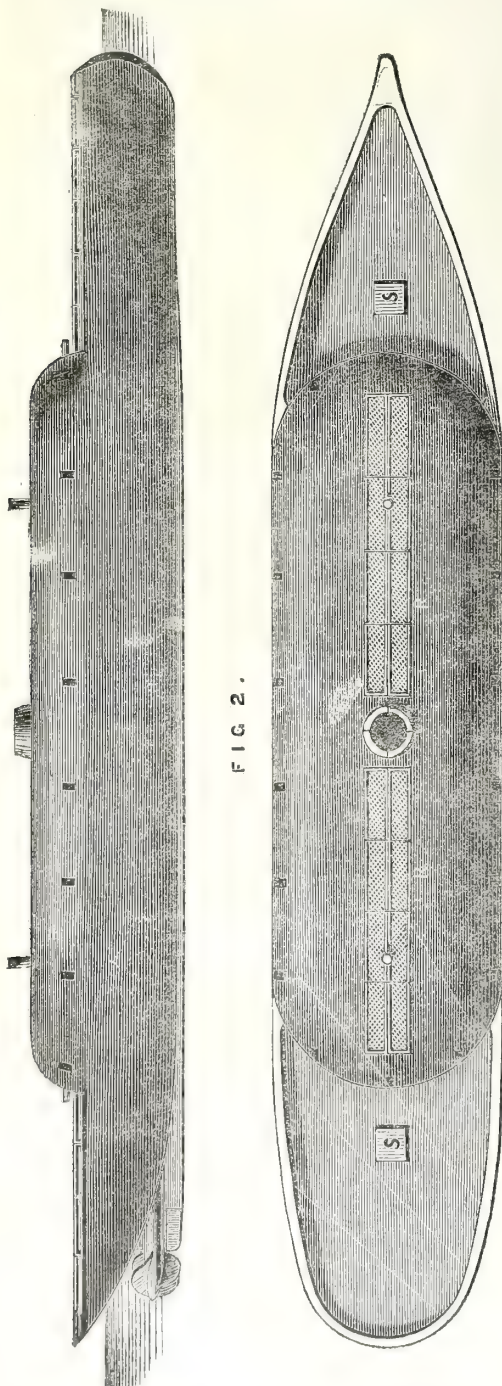
I propose to arm this vessel with 14 guns, two of which are to be of very heavy calibre, one forward and the other aft, being bow and stern chasers, firing in a line with the keel. The guns on either side may be fired in the same direction, or as broadside guns, by shifting them, there being spare ports for the purpose. Thus, three guns can be brought into action, whether chasing or retiring, and six on the broadside.

The cellular keel and bottom will allow sufficient water to be admitted to immerse the ship from a foot to eighteen inches; thus one foot of armour plating might be dispensed with, and a smaller mark displayed to the enemy.

This plan of defending the guns, in addition to the advantage of having a battery of three guns forward and aft, will reduce the weight of hull and armour plates.

Smaller vessels on this plan, drawing ten feet of water, and mounting four guns, might be very effectively em-

* This model was designed by us to meet conditions suggested by Rear-Admiral George Elliott, and submitted by him to the Admiralty and War Office, in June, 1861.

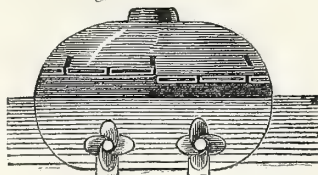


space, and save labour, I advocate a more extended use of simple mechanical contrivances than has heretofore been the custom, and if the reduction in the crews that has been spoken of is carried out in consequence of de-

ployed in rivers, small harbours, and creeks, they being capable of grounding without injury, and when grounded, of being upright. Moreover, such a shield vessel, having the power of turning as described, would become "the

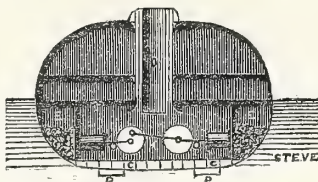
all the arrangements I have described there is a *duplicate of every principal part*, so that in the event of one breaking down, the ship may never be totally disabled, except

FIG. 5.



under very extraordinary circumstances. This will, I believe, be admitted by sailors (and it is to them more

FIG. 6.



especially I address myself) to materially enhance the efficiency of a steamship of war of whatever description.

Models of these vessels may be seen at the Naval Department of the International Exhibition, Class 12, No. 2,715, and at 10, Adam-street, Adelphi.

EXAMINATION PAPERS, 1862.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(Continued from page 560.)

MENSURATION.

THREE HOURS ALLOWED.

1. Find the number of feet and inches in the rectangles, which are:—

- (1.) 11 feet 7 inches by 7 feet 11 inches.
- (2.) 11 feet $7\frac{1}{2}$ inches by 34 feet $11\frac{1}{2}$ inches.
- (3.) 50 feet 5 inches by 31 feet 2-4 inches.

2. The area of a rectangle is 83 feet 123 inches, and one of its sides is 14 feet 7 inches. Find the other side.

3. What will it cost to paper a room which is 18 feet 10 inches long, 15 feet 5 inches wide, and 11 feet 2 inches high, the paper being 27 inches wide, and $4\frac{1}{2}$ d. a yard?

4. How many standard rods of brickwork are there in a wall which is 36 feet 3 inches long, 6 feet 5 inches high, and $2\frac{1}{2}$ bricks thick?

5. Prove experimentally that the square on the hypotenuse of a right-angled triangle is equal to the sum of the squares on the other two sides.

6. The diagonals of a diamond-shaped pane of glass are $3\frac{1}{2}$ and 4 inches. How many will be required to glaze a window which is 2 feet 4 inches by 3 feet 6 inches?

7. A rectangular lawn of an acre in extent is surrounded by a gravel walk of uniform breadth, the sides of which are $4\frac{1}{2}$ and 4 chains in length. Find the breadth of the walk.

8. A vessel contains 78 feet 1698 inches; its sides are in the ratio of 2 to 3, and its depth is 3 feet 7 inches. Find the lengths of the sides.

9. How many gallons will this vessel hold? Find the

FIG. 3.

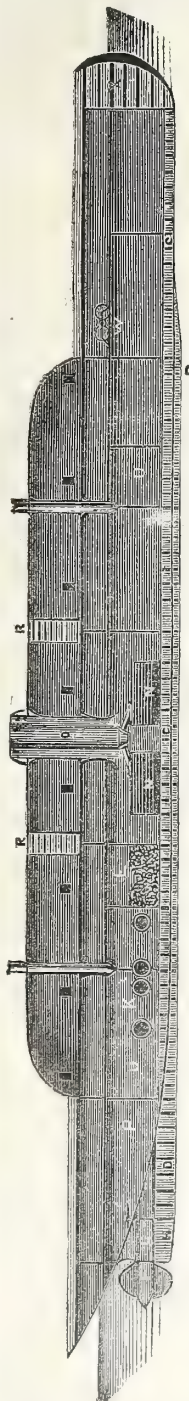
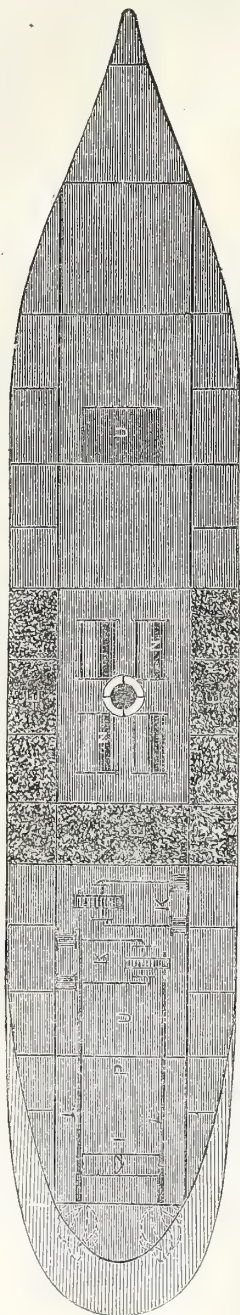


FIG. 4.



turntable," and thus bringing the guns into action as required, would possess most of the advantages claimed for the cupola system without its defects.

In conclusion, I beg to call attention to the fact that in

cost of lining it with lead one-eighth of an inch thick, at 18s. per cwt.*

10. Find the depth of a cylindrical vessel which holds 50 gallons, the diameter being two feet.*

11. A circular ring contains 10 cubic inches; its whole surface, plane and curved, is 40 inches, and its section is a square. Find the diameter.

12. A spherical bullet an inch in diameter is shot clean through a board 4 inches thick. Find the quantity of wood carried away—

(1) When the bullet goes through in a direction at right-angles to the surface.

(2) When it goes through obliquely.

13. How many square feet of bark would come off a tree whose girth at the base is 4 feet, and at the top $1\frac{1}{2}$ feet, and whose height is 35 feet, the tree tapering uniformly from bottom to top?

14. The slant side of a tumbler is 5 inches, the diameter of the top 4 inches, and of the bottom 3. Find the weight of the water which it will contain.*

15. A hemisphere and a cylinder have the same volume and the same diameter. Find the ratio of their surfaces.

16. Define a pyramid. Prove that the volume of a pyramid = $\frac{1}{3}$ base \times perpendicular height.

TRIGONOMETRY.

THREE HOURS ALLOWED.

1. Find the unit when the equation, angle = $\frac{8}{\pi}$ arc rad.

is an expression for the angle. What is the meaning when the arc is a quadrant?

2. Trace the changes of sign and value of $\cos. A - \sin. A$, as A increases from zero to 2π . Find all the values of $\sin. 2A = \frac{1}{2}$.

3. Given, $\sin. A$. and $\cos. A$: Find $\sin. 2A$ and $\cos. 2A$, without using $\sin. (A + B)$ or $\cos. (A + B)$.

4. One side of a triangular field is 2000 feet, the bearings of the third angle from its corners are 60° and 45° ; find the number of square yards in the field.

5. Find A from the equations—

$$(1.) \tan. \left(\frac{\pi}{4} + A \right) = 3 \tan. \left(\frac{\pi}{4} - A \right)$$

$$(2.) \tan 2A + \cot. A = 8 \cos. 2A.$$

6. Show that—

$$(1.) \tan 3a - \tan 2a - \tan a = \tan 3a. \tan 2a. \tan a.$$

$$(2.) \sin. (A - B) + \sin. (B - C) + \sin. (C - A) + 4 \sin. \frac{A - B}{2} \sin. \frac{B - C}{2} \sin. \frac{C - A}{2} = 0.$$

7. If A', B', C' be the three exterior angles of the triangle ABC , and S be the semi-perimeter, then—

$$\frac{\text{Vers. } A'}{\sin. A} + \frac{\text{Vers. } B'}{\sin. B} + \frac{\text{Vers. } C'}{\sin. C} = \frac{S^2}{\text{Area.}}$$

8. A person, a feet from a tower on which is a spire, observes that the top of the tower is in a line with that of a hill. From a point na feet further from the tower, he finds that the spire subtends at his eye the same angle as before, and has its top in a line with that of the hill. If the height of the tower also = na , show that the hill's height is $\frac{n^2 a}{n^2 - 1}$.

9. If A, B, C be the three angles of a triangle, then

$$\frac{\sin. A + \sin. B - \sin. C}{\sin. A + \sin. B + \sin. C} = \tan. \frac{A}{2} \tan. \frac{B}{2}$$

10. Find the sum of n terms of the series—

$$\sin. a. \sin. 2a + \sin. 2a. \sin. 3a + \sin. 3a. \sin. 4a, \&c.$$

11. In spherical trigonometry prove that—

$$\tan. \frac{1}{2} (a + b) : \tan. \frac{1}{2} (a - b) :: \tan. \frac{1}{2} (A + B) : \tan. \frac{1}{2} (A - B).$$

A and B being angles, and a, b , being the opposite arcs.

12. ABb, AcC , are two arcs of great circles meeting in A ; BC, bc are two others. Find BC , when AB, Bb, Ac, cC are given.

13. Prove in any spherical triangle that—

$$\cos. a = \cos. b. \cos. c + \sin. b. \sin. c. \cos. A.$$

14. Deduce from this $\cos. A$, in case of a rectilinear, triangle.

CONIC SECTIONS.

THREE HOURS ALLOWED.

SECTION I.—GEOMETRICAL CONICS.

1. Define a tangent to a conic. If the tangent to a parabola at a point P meets the directrix in Z , prove that SZ is perpendicular to SP .

2. What is a diameter of a parabola? Show that all diameters of a parabola are parallel to each other, and that the tangent at the point where a diameter meets a parabola is parallel to the corresponding ordinates. In what sense is it a "limit" of them?

3. The radius of the circle of curvature of a parabola at its vertex is equal to twice the focal distance.

4. Define an ellipse. Show that it has two foci and two directrices; and that the sum of the distances of any point in its plane from the foci is greater or less than the major axis, according as the point is within or without the ellipse. What is the corresponding property of the parabola?

5. Prove that the major axis of an ellipse, the tangents at the extremities of a latus rectum, and the corresponding directrix, all pass through the same point.

6. P and D are the extremities of a pair of conjugate axes in an ellipse, of which C is the centre, and S and H are the foci. Show that $SP \times HP = CD^2$. If the ellipse is projected orthogonally into a circle, what do the projections of a pair of conjugate diameters become?

7. The asymptotes and one point of a hyperbola are given. Determine other points of the curve by a geometrical construction.

8. If the normal at any point P of a hyperbola meets the transverse axis in G , then $SG : SP :: CS : CA$.

9. Draw a tangent to a conic from a point without it; (1) by a direct construction; (2) by means of the projective properties of the circle.

10. Define a cone. If a cone is right, show that the section made by a plane parallel to a slant side is a parabola. If a cone is oblique, show that two circular section may be made through any point in its surface.

SECTION II.—ANALYTICAL CONICS.

11. Find the length of the perpendicular drawn from (x_1, y_1) on the line passing through the two points (x^2, y^2) and (x_3, y_3) ; and hereby determine the area of the triangle of which these three points are the vertices.

12. If the base of a triangle is given, and the difference of the squares of the sides is constant, prove that the locus of the vertex is a straight line perpendicular to the base.

13. Find the equation to a circle, when the origin is a point on the circumference. Hence prove that the angle in a semicircle is a right angle, and that the sum of the opposite angles of a quadrilateral figure inscribed in a circle is equal to two right angles.

14. Determine the equation to the tangent of an ellipse; and prove that the distance from the centre of the point of intersection of the tangent with the perpendicular on it from the focus is equal to the semi-major axis.

15. If (x_1, y_1) (x^2, y^2) are the extremities of two conjugate axes of an ellipse, prove that

$$\frac{x_1^2}{a^2} + \frac{y_1^2}{b^2} = 0.$$

* A gallon contains 277.274 cubic inches.

A gallon of water weighs 10 pounds avoirdupoise.

Lead is 11.35 times as heavy as water.

16. Prove analytically the theorems contained in questions 1, 2, 5, 8, of the preceding section.

17. What relations exist among the co-efficients in the general equation of the second degree when it represents (1) two intersecting straight lines; (2) two parallel straight lines.

18. Examine and trace the lines represented by the following equations:—

$$(1) 4x + 3y - 12 = 0$$

$$(2) 3x^2 + 2xy + y^2 - 4x = 0$$

$$(3) 3x^2 - 4xy + a^2 = 0$$

(To be continued.)

Home Correspondence.

CONDENSED AIR FURNACES.

SIR,—The principle on which these furnaces are constructed is that of burning the fuel, whatever it may be, in a chamber artificially filled and supplied with air at a greater density than that of the ordinary atmosphere.

The heat obtained by combustion varies, so far as quantity is concerned, according to the weight of oxygen that has combined with the carbon or hydrogen in the fuel. The intensity of that heat increases in a high ratio with every increase in the rapidity with which that combination is effected. For example, in rarified air, such as exists at elevated levels, combustion is languid. At the top of high mountains even sulphur and alcohol give little heat, and at certain altitudes can scarcely be kept alight at all. On the other hand, the slight condensation of air produced by cold renders our common fires more intense, causing them, as we say, to "burn frosty."

We may be sure that this intensification does not cease at the atmospheric density represented by a pressure of 30 inches of mercury, but proceeds to a (theoretically) unlimited extent. Practically there is no difficulty in establishing an atmosphere artificially condensed to a pressure at least three or four times greater than that of our normal barometrical standard, and supplying, at that pressure, as much air as the furnaces, &c., employed may require for their consumption.

This effect I propose to accomplish by my new patent furnace. The mechanical apparatus required presents no serious difficulties, and would necessitate no very serious cost. The useful results that may be thus realised are twofold in character, namely, mechanical and chemical.

Chemically, as the air supplied to the burning fuel will contain, bulk for bulk, two, three, or four times the usual quantity of oxygen, the incandescent particles of carbon or hydrogen are so much the more easily enabled to find their proper dose of that element, and to enter into combination with it. The atoms of oxygen are at the same time pressed into closer contact with those of the fuel; and it is well known that all chemical action supervenes with rapidly increasing intensity as the combining elements are brought into nearer proximity. The space, moreover, within which the actual process of combustion is completed, that is, through which the vaporised particles of combustible matter have to travel before they meet with oxygen enough to burn them, is diminished; and the burning atoms being thus kept in closer companionship, the resultant product both of heat and light is enormously enhanced. As diffusion rapidly attenuates heat and light, so compression as rapidly intensifies both.

Mechanically, one great advantage will be obtained from the much smaller volume of air that must be passed through the furnace in order to ensure rapid combustion. In our blast furnaces several thousand cubic feet of air are often blown in per minute, and nearly equal volumes are carried through furnaces of another construction by the powerful draft produced by enormous chimney-stacks or the injection of steam. This current of air, while feeding an intense combustion, carries off a large per-centage of

the heat evolved. By various ingenious contrivances much of this heat is afterwards arrested and utilised, but it is altogether lost at the point where it is chiefly required—that is to say, in the furnace itself.

A second advantage arises in this wise:—As the heat from the burning fuel is communicated to the body on which it has to act, not only (or chiefly) by actual contact, but by the intensely-heated air that has passed through the incandescent mass, the calorific effect will be increased by the presence, in a given bulk, of a large number of heat-producing atoms; and as the passage of this air may be rendered slower, these atoms can also be longer retained in contact with the body to be heated. Among other results of this action may be reckoned a considerable diminution in the surface area of steam-boilers, as measured by their evaporating powers.

In its application to steam-engine furnaces, the "condensed air system" would present the further advantage of producing high-pressure steam of 45 or 60 lbs. to the inch from thin boilers, worked with a loose valve, thus saving expense, and avoiding all risk of explosion.

In founding iron, steel, glass, &c., great compactness, strength, and homogeneity are obtained by creating, at enormous expense and trouble, a large "head" of fused material above the mould. The mechanical pressure exercised by an atmosphere of threefold density is in itself equivalent, in the case of iron, to a "head" of nearly 15 feet, and in that of glass of more than 40 feet of melted "metal" in perpendicular height.

Furnaces on the condensed-air principle may be applied to almost every purpose—for smelting ores, calcining, refining, and casting metals, manufacturing glass, porcelain, &c., and generating steam. The advantages of the system are:—

1. A degree of heat, when required, far exceeding that at present attainable.

2. Heat such as can now be obtained only in the centre of large masses of burning fuel, produced and maintained in a much smaller compass, and by the combustion of a much less quantity of coal, &c.

3. Heat exceeding that of the blast furnaces produced without the blast, which is inadmissible in many operations of glass and porcelain manufacture, &c.

4. The absolute command over the intensity and direction of the heat, by regulating the supply and density of the air, opening various entrance and exit valves, &c.

5. The corresponding command over the products of combustion as well as of the operations conducted within the furnaces. The condensed air and accompanying vapours may be passed through water tanks and otherwise treated at pleasure before their ultimate dismissal. By this means all noxious effluvia will be arrested, many products now lost will be rendered valuable, and large districts now barren and almost uninhabitable restored to fertility.

6. The abolition of the enormous chimney stalks and other contrivances for coaxing a sufficient draft of air through the furnaces, which entail so much expense and occupy so much space.

7. The possibility of employing anthracite or other coarse and cheaper qualities of coal, in processes now requiring the high-priced combustible.

8. A large reduction in the size of furnaces for every purpose, effecting a considerable economy in the original outlay, and a permanent saving in the expenditure for repairs.

9. A general saving, on the average, of fully one-third in the consumption of coal, taking the whole process of manufacture.

As an ultimate result, the new system will diminish the size, cost, and consumption of furnaces, will enable the manufacturer to command greater heat in a smaller compass, in a more manageable way, and from a much reduced quantity of cheaper fuel. Analogous effects may be produced in the development of light—and many novel processes introduced in all chemical or manufacturing

operations connected with evaporation, distillation, crystallization, sublimation, destructive distillation, &c., &c. New fields are in fact opened of almost unlimited extent and fertility. But into these branches of the subject it is needless to embark at present.

The condensed air chambers will be constructed of sufficient capacity to contain not only the furnaces, &c., but also the moulds, forges, and other apparatus required for the manipulation of their products as well as the workmen so employed. The denser air will not prove injurious to the latter, at all events if not exceeding four atmospheres. In the submarine operations lately conducted rather extensively, the men have found no inconvenience in working for many hours together at 20 fathoms depth, every 5½ fathoms representing an additional atmosphere of pressure.

The original cost of constructing the proposed air-tight chambers, together with the pumping apparatus, will rarely exceed the amount economised in the size of the furnaces, the present blowing machines, and chimney stalks, and the boilers of steam engines.

The power required to maintain a sufficient supply of condensed air will cost little, and sometimes nothing; as the used air emitted at one end of the apparatus will always nearly if not quite suffice, by a simple arrangement, to work the pumps condensing that which is forced in at the other. In many cases indeed, where the escaping air is dismissed at a comparatively high temperature—say 200° F. or more, it will have been so expanded as not only to work the condensing pump, but to leave a considerable margin of extra power available for other work, thus dispensing with the usual steam engine.

I am, &c., A. J. JOYCE.

15, Cambridge-terrace, Hyde-park, W., 5th July, 1862.

Proceedings of Institutions.

EBBW VALE LITERARY AND SCIENTIFIC INSTITUTION.
—The report for the year 1861-62, read at the annual meeting of members, July 1st, says that the previous report was so unfavourable, and in so desponding a tone, that it was with some degree of anxiety the present and retiring committee entered upon their year of office; they feel, however, on a retrospect of the proceedings of the past year, and a view of the present state and future prospects of the Institution, that they can give a much more cheering and hopeful account. The rooms have been remarkably well attended, and the number of subscribers, whose names have been entered upon the books, has risen to 314 (exclusive of honorary members). First quarter, July to October, 210; second quarter, to December, 229; third quarter, to April, 244; fourth quarter, to July, 230. During the past year, an Elementary Instruction Class, numbering 40 members, has been formed; this class, for the greater convenience of working, has been subdivided under the different heads of "Mechanical Drawing," "Grammar," "Reading, Writing, and Dictation," and "Arithmetic," which meet respectively on Monday, Tuesday, Wednesday, and Thursday evenings. These have been kindly presided over by Messrs. Thomas Morgan, W. J. Gwyther, Thomas Henry, and Charles Newman, to whom the committee are much indebted for their services. It is true that in consequence of the inconveniently small size of the class-room, the meetings of all but the Mechanical Drawing Class have for a time been suspended, but a room more convenient, larger, and well adapted for the purpose is in course of completion, and it is confidently hoped that in a short time the whole of the class will resume its sittings. Since September 1861 there has been formed a Welsh Grammar Class, meeting on every Friday evening. The number of members in this class is 16, and the average nightly attendance 13. In this class the members exercise themselves in reading, translating the best specimens of English prose composition into Welsh,

in delivering short essays in that language, and in discussions. Small prizes also have been competed for amongst the members, and altogether the meetings have been very successfully conducted. In order to encourage in some measure these praiseworthy efforts at self-culture, a few of the members of the Committee, assisted by some friends of the Institution, have established on a small scale a Local Prize Scheme, offering prizes for the best Welsh and English compositions on various subjects; at present it may be regarded merely as an experiment. The subject for this year, in both English and Welsh, is, "The advantages to be derived by working men from Literary and Scientific Institutions." Prizes of equal amount will be awarded to the successful essays in both languages:—1st prize, £2 10s.; 2nd prize, £1. The adjudicators are the Rev. C. F. C. Pigott, M.A. of Llanwenarth, and the Rev. Wm. Roberts, of Blaenau. Six English and three Welsh compositions have been sent in. The report of the adjudicators has not yet been received by the Committee. The Committee add that it is much to be hoped that at no very distant period some of the members will avail themselves of the assistance and advantages which this Institution possesses by being connected with the Society of Arts, and become competitors for the certificates and prizes annually offered by that body. On the unexpected retirement of Mr. Small, who had most efficiently filled the office of Honorary Librarian for four years, the Committee were fortunate enough to secure the services of Mr. Charles Newman, who reports favourably with regard to this department. The issue of books for this year has exceeded that of the last by 504, being the difference between 2,546 and 3,150. The subjoined is an approach towards a classification:—

	English.	Welsh.
History	121	37
Biography	149	10
Voyages and Travels	165	13
Art, Science, and Philosophy	195	24
Tales and Novels	1179	11
General Literature	731	100
Religious Literature	124	109
Poetry	103	79

The books now number 1,427 volumes, of which 45 have been added this year, viz.:—24 bound periodicals, 12 purchased by the Committee, and 9 presented. During the last year upwards of 60 ancient and modern, foreign and English coins have been presented; 8 specimens illustrative of natural history; 20 geological and mineralogical specimens; together with many curious and interesting objects. The reading room has been exceedingly well frequented. Some few alterations in the papers and periodicals have been made during the past year. The annual *soirée* took place in August, and was most satisfactory; it attracted the attention of about 600 members and friends. The expenses were considerably lessened by the valuable services of several lady and gentleman amateurs, who sang a variety of glees and madrigals; by the gratuitous services of the Ebbw Vale Rifle Volunteer Band; and by the kind assistance of the lady members and friends who presided over the refreshment tables. To these circumstances may be attributed the balance of £8 1s. 11d. in favour of the Lecture and Entertainment Committee. In addition, two entertainments have been given this year:—one entitled, "Shadows on the Wall," by Mr. Basil Young, and the other (musical) by Mr. Owen, of Chester (Owain Alaw), and others. By these the sum of £3 8s. 8d. was realized. By a lecture on "The Philosophy of True Manliness," by Mr. Vincent, a loss of £1 1s. 6d. was sustained. The Treasurer's account shows that the income of the Institution has been £80 4s. 1d., and that there is a balance in hand of £11 10s. 10d. It is satisfactory to be able to state that, in addition to the above balance, the old debt due to the treasurer at the close of the year has been liquidated.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par
Numb.*Delivered on 5th and 7th July, 1862.*

338. Alderney—Plan of the Work.
 369. Thames Embankment Bill—Copy of Correspondence.
 360. Fisheries (Ireland) Bill—Report from Committee.
 310. Police (Scotland)—Report of the Inspector of Constabulary.
 293. Natal—Copy of Despatches.
 363. Military Savings Banks—Account.
 364. Coals (Woolwich and Portsmouth)—Return.
 367. Judgments (Courts of Common Law)—Return.
 368. Hackney Carriage Drivers (Metropolis)—Abstract of Return.
 371. Imports from France—Return.
 181. Bills—Metropolis Local Management Acts Amendment (amended).
 186. „ Stipendary Magistrates (amended).
 187. „ Merchandise Marks (as amended by the Select Committee, and on Re-commitment).
 188. „ Bleaching and Dyeing Act Amendment.
 189. „ Public Offices Extension.
 190. „ Jamaica Loan (Settlement).

Delivered on 8th July, 1862.

282. Revenue—Return.

Delivered on 9th July, 1862.

319. Steam Vessels—Return.
 277. Alice Delin—Return.
 378. Railway and Canal Bills—Eleventh Report from Committee.
 121. Bills—Highland Roads and Bridges.
 192. „ Savings Banks (Ireland).
 194. „ Divorce Court.
 195. „ Red Sea and India Telegraph Company—Lords Amendments.
 French Occupation of Rome—Papers.
 Dr. McCarthy's Assassination at Pisa—Papers.

Delivered on 10th July, 1862.

305. Army (Military Stations, &c.)—Return.
 375. Education (Ireland)—Annual Report of the Commissioners.
 193. Bills—Tramways (as amended by the Select Committee, and on Re-commitment to the same Committee).
 196. „ Gardens in Towns Protection.
 197. „ Courts of the Church of Scotland.
 198. „ Recovery of Poor Rates, &c.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

*[From Gazette, July 18th, 1862.]**Dated 11th March, 1862.*

652. J. Nadal, 14, Brook's Market, Brooke street, Holborn—An improved portable fountain for water or other liquids.

Dated 17th March, 1862.

728. A. S. Stocker and A. R. Stocker, Wolverhampton—Imp. in the manufacture and construction of metal boot heels and tips and horse shoes.

Dated 31st March, 1862.

887. M. A. F. Menons, 39, Rue de l'Échiquier, Paris—Imp. in the manufacture from vegetable product of glucose or fermentable sugar. (A com.)

Dated 14th April, 1862.

1074. R. A. Brooman, 166, Fleet-street—Imp. in carriages for transporting loads on railways, common roads, and other surfaces. (A com.)

Dated 20th May, 1862.

1520. M. A. F. Menons, 24, Rue du Mont Thabor, Paris—Improved processes for the conversion of amylaceous matters into saccharine and other useful products. (A com.)

Dated 22nd May, 1862.

1541. J. H. Perry, 72, Piccadilly, St. James's—An improved method of curing diseases of the human body by magnetism.

Dated 23rd May, 1862.

1612. P. Boisset and B. Antognini, New York—Imp. in the manufacture of boots and shoes.
 1613. P. Boetius, Great George-street—A new mode of cooling (refrigerating) hot liquids, and condensing steam.

Dated 3rd June, 1862.

1669. T. L. Scowen, Allen-road, Stoke Newington—Imp. in indicating time and accent in music.

Dated 5th June, 1862.

1693. J. E. Moiroux, Windmill-street, Tottenham-court-road—A new compound for protecting and preserving the polish, polished and other surfaces of metals, woods, skins, and paper, and for rendering all woven, textile, and other fabrics water and weather proof.

Dated 11th June, 1862.

1734. J. Shand and S. Mason, 245, Blackfriars road—Imp. in the construction of steam boilers.

1738. W. Holland, Adelphi Mills, Salford, Lancashire—Certain imp. in carding engines.

Dated 12th June, 1862.

1751. H. S. Firman and W. J. Williams, 73, Great Suffolk-street, Southwark—Imp. in lamps, more particularly designed for burning paraffine or coal oil and other hydro carbons of different grades, or any combustible material used for obtaining light. (A com.)

Dated 16th June, 1862.

1777. C. E. Courtillier, 184, Boulevard Magenta—Improved inhaling and saturating apparatus.
 1779. J. F. Allan, Glasgow—Improved furnace arrangements to prevent smoke and economise fuel.
 1781. J. Evans, Hyde, Cheshire—Imp. in self-acting mules.
 1783. H. Bright, Woodford, Essex—Improved apparatus or arrangements for screening fires in stoves and grates with the view to avoid accidents.

Dated 17th June, 1862.

1785. S. H. Huntly, 50, Upper Baker-street, Regent's-park—Imp. in the construction of furnaces for effecting the more perfect combustion of the fuel.
 1786. A. Crestadoro, 19, Great Ormond-street, Queen-square—Imp. in obtaining and applying motive power from rarefied air and from aeriform fluids.
 1787. J. Hunt, Birmingham—An imp. or imp. in bronzing or colouring articles of copper or alloys of copper.
 1789. A. W. Makinson—Imp. in locomotive and stationary engines.
 1791. A. Pringle, 39, Gloucester-crescent, Camden-town—Certain imp. in locks.
 1793. S. Varley, Sleaford, Lincolnshire—Imp. in reaping machines.

Dated 18th June, 1862.

1799. J. Warren, Maldon, Essex—Imp. in ploughs.
 1801. W. E. Newton, 66, Chancery-lane—Imp. in electrical brushes. (A com.)

Dated 19th June, 1862.

1803. J. L. Smith, 18, St. John's-square, Clerkenwell—A universal fire alarm with discharging apparatus.

Dated 25th June, 1862.

1865. A. Bayley, Liverpool—Imp. in lamps.

Dated 26th June, 1862.

1875. T. R. Tebbutt, Manchester—Certain imp. in the manufacture of soap, soda, and other material employed for the purpose of washing and cleansing.
 1877. J. B. Coquatrix, Rue Folie Mericourt, Paris—Imp. in weaving carpets, tapestry, and similar fabrics, and in apparatus for the same.
 1879. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the construction of electro voltaic plate work for medical and other purposes. (A com.)
 1880. J. H. Johnson, 47, Lincoln's-inn-fields—A new composite fluid to be used for illuminating purposes. (A com.)

Dated 27th June, 1862.

1881. A. Anderson, Islington—Imp. in apparatus for steering ships or other vessels.
 1882. J. Watson, 10, Old Bailey—Imp. in printing machines, and apparatus connected therewith for printing from letter-press forms.
 1883. C. Cochrane, Middlesbro'-on-Tees—Imp. in the manufacture of aluminate of soda and potash.
 1885. C. Cochrane, Middlesbro'-on-Tees—Imp. in the manufacture of iron.
 1887. W. Owen, Coventry—The manufacture of woven tickets of silk, cotton, or wool, or mixture of those materials, for the purpose of marking or advertising goods.
 1889. A. H. Martin, Buttershaw, near Bradford—Imp. in means or apparatus employed in weaving.
 1890. I. Holden, Bradford—Imp. in means or apparatus for preparing and combing wool and other fibrous materials.
 1891. A. A. Croll, Coleman-street—Imp. in the treatment of ammoniacal liquor of gas works.
 1892. D. L. Banks, 17, Gracechurch-street—A new method of constructing a portable covered coffer dam or apparatus for facilitating operations under the water, in the water, or out of the water, and apparatus connected therewith.
 1893. D. L. Banks, 17, Gracechurch-street—A method of constructing a portable sectional dry dock, and apparatus connected therewith.

Dated 28th June, 1862.

1895. T. King, Grafton, and J. King, Chadshunt, Warwickshire—Imp. in agricultural machines.
 1896. C. Beslay, Rue Menimontant, Paris—Imp. in galvanising or coating metals by electro-chemical agency, and in apparatus connected therewith.
 1899. G. W. Belding, 7, King-street, Cheapside—An improved flexible spring cloth or fabric especially adapted for the manufacture of ladies' skirts.
 1900. C. Callebaut, 4, South-street, Finsbury—Certain imp. in sewing machines.
 1901. J. Tatham, Rochdale—Imp. in machinery or apparatus for preparing, spinning, doubling, and winding cotton, wool, and other fibrous materials.
 1903. J. Webster, 142, Woodbridge-road, Ipswich—Imp. in the means of protecting steam boilers from incrustation.

Dated 30th June, 1862.

1905. J. Wall and T. Dodd, Liverpool—Imp. in taps for controlling the flow or passage of fluids.
1906. W. Thomas, Liverpool—Imp. in the running gear of four-wheeled carriages.
1907. J. Hartshorn, Mansfield-road, Nottingham—Imp. in the manufacture of lace.
1908. A. Byrnes, 5, Metropolitan-buildings, Mile End New Town—Imp. in breech-loading fire arms.
1909. W. E. Gedge, 11, Wellington-street, Strand—Imp. in looms for weaving. (A com.)
1911. W. E. Newton, 66, Chancery-lane—Improved apparatus for picking or gathering cotton. (A com.)
1913. T. Parker, Woodhouse Carrs, Leeds—Imp. in tinting or dyeing fabrics composed of mixed animal and vegetable fibres.

Dated 1st July, 1862.

1917. R. A. Brooman, 166, Fleet-street—Imp. in the construction of blast furnaces. (A com.)
1919. G. H. Birkbeck, 34, Southampton-buildings, Chancery-lane—Imp. in processes for the utilisation of certain refuse products resulting from the manufacture of iron, such processes being applicable to the treatment of other metallic or mineral substances. (A com.)
1920. J. Greenhalgh, Hyde, and J. Greenhalgh, Audenshaw—An improved diminishing valve, and also a water or steam escape apparatus to give alarm in case of fire, and to assist in quenching the same.
1921. T. Fellowes and H. Hemfrey, Spalding—Imp. in apparatus for elevating straw and other agricultural produce.
1923. W. E. Newton, 66, Chancery-lane—Improved machinery for washing wool. (A com.)

Dated 2nd July, 1862.

1924. E. de Labastida, 43, Hart-street, Bloomsbury-square—A new method of manufacturing india-rubber articles, by the simultaneous combination of pressure and vulcanisation. (A com.)
1925. W. Porter, Fleetwood—Imp. in the manufacture of targets.
1927. J. Ellerbeck, Heywood, Lancashire—Imp. in looms for weaving.
1929. T. L. Atkinson, Stamford-street, Blackfriars-road—Imp. in the construction of stew pans and other such like cooking utensils.
1930. G. H. Hulskamp, 53, Chancery-lane—Imp. in violins and other similar stringed instruments, and in guitars.
1931. J. Murray, Whitehall-place—Imp. in portmanteaus.
1933. J. Crisp and J. W. Elliott, East King-street, South Shields—Imp. in apparatus for burning American rock oil, paraffine oil, oil of petroleum, and other inflammable oils, spirits, or essences.
1935. G. Bedson, Manchester—Imp. in rolling wire and other rods or bars of metal.

Dated 3rd July, 1862.

1941. T. Edmunds, Seymour-place, Bryanstone-square—Imp. in preparing compressed fruits in cakes.
1943. J. Miles, Street, near Glastonbury, Somersetshire—Imp. in machinery for cutting out soles and other parts used in the manufacture of boots and shoes, and also parts used in the manufacture of other articles.

Dated 4th July, 1862.

1944. S. Russell, 27, Shaftesbury-crescent, Fimlico—Imp. in stereoscopes.
1945. W. J. Cunningham, Everett-terrace, Victoria Dock-road—Imp. in sewing machines.
1946. A. Drevelle, Manchester—Imp. in machinery or apparatus for laying cards or sheets of metal into woven or textile fabrics ready for the press, and also for folding, measuring, or stretching the said fabrics, paper, and other materials.
1947. S. Whitham, Wakefield—Imp. in the manufacture of iron and steel, and in the apparatus employed for that purpose. (A com.)

Dated 5th July, 1862.

1949. H. Rushton, 48A, Northampton-road, Clerkenwell—Imp. in covering crinoline steels.
1950. R. A. Brooman, 166, Fleet-street—Imp. in hollow plates for hydraulic presses. (A com.)
1951. Capt. O. F. Bystrom, Stockholm, Sweden—An improved pyrometer.
1952. C. G. Hill and W. Jackson, Commerce-square, High Pavement, Nottingham—Imp. in machinery or apparatus for producing ornamental patterns or figures and attaching them to lace or other fabrics.

1953. A. Warner, 31, Threadneedle-street—Imp. in preparing materials for and in purifying coal gas.

Dated 7th July, 1862.

1957. T. Edwards, Liverpool—Improved movement for the indices for gas, water, and other fluid meters.
1959. J. P. Booth, Cork—Imp. in the manufacture of feather beds, quilts, bolsters, and pillows.

Dated 8th July, 1862.

1960. W. Spence, 50, Chancery-lane—Imp. in telegraphic apparatus. (A com.)
1962. C. B. Gruner, 25, Alfred-street, River-terrace, Islington—Imp. in photographic apparatus.
1968. J. Bourke, Her Majesty's 29th Regiment of Foot, Curraghleagh, Clannorris, Ireland—Imp. in military accoutrements.

Dated 9th July, 1862.

1972. T. C. Gibson, Ramsey, Isle of Man—Imp. in the construction of ships and vessels for the purpose of carrying and warehousing petroleum, palm oil, and other oils or inflammable fluids.
1974. H. S. Pontifex, Banbury—Imp. in apparatus for distributing water applicable to cleansing casks or other vessels, or for other purposes.
1976. C. F. W. Rust, London Wall—Imp. in concertinas and other wind instruments of that class. (A com.)
1980. T. Green, Leeds, and R. Mathers, 2, Victoria-street—Imp. in steam boilers.
1982. J. O. Butler, Kirkstall Forge Company, near Leeds—Imp. in steam hammers and in framings therefor.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

1971. J. M. Gille, 24, Rue du Mont Thabor, Paris—An improved calendar inkstand.—9th July, 1862.
1990. E. Townsend, Massachusetts—A new and useful invention for making nails, and driving such nails into the sole of a boot or shoe. (A com.)—10th July, 1862.
2006. M. A. F. Mennons, 24, Rue du Mont Thabor, Paris—Certain imp. in vessels mounted as floating batteries. (A com.)—12th July, 1862.

PATENTS SEALED.

[From Gazette, July 18th, 1862.]

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|-------------------------|-------------------------------|
| <i>July 18th.</i> | 259. W. Walton and F. Walton. |
| 158. A. J. Martin. | 276. T. Cook. |
| 159. R. A. Brooman. | 279. W. Clark. |
| 160. W. Burgess. | 283. D. Joy. |
| 165. F. W. Gerish. | 291. C. M. Roullier. |
| 166. E. Pace. | 316. M. Henry. |
| 178. A. Ripley. | 338. M. A. F. Mennons. |
| 184. W. Clark. | 650. H. H. Kromschweder. |
| 185. J. Longhurst. | 759. F. Warner. |
| 195. J. C. F. Mougin. | 1003. J. Lawson. |
| 235. W. Clark. | 1012. W. Davies. |
| 246. E. A. Rippingille. | 1015. C. Mather. |
| 250. W. Clark. | 1113. J. W. Ford. |

[From Gazette, July 22nd, 1862.]

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| <i>July 22nd.</i> | 222. S. C. Lister & J. Warburton. |
| 188. T. Morris, R. Weare, and E. H. C. Monckton. | 238. B. Foster and J. Moore. |
| 189. C. G. Hall. | 242. M. Collier. |
| 194. C. West. | 244. M. Allen. |
| 197. D. Eldeston & H. Gledhill. | 245. T. Gontard. |
| 198. E. A. Curley. | 247. J. Firth. |
| 200. F. J. L. Lefort. | 252. A. Lahousse. |
| 202. J. Brown and J. Davenport. | 253. D. Littlehales. |
| 207. R. Martindale. | 896. R. Burley. |
| 208. C. W. Harrison. | 922. W. C. Harrison and H. J. Standly. |
| 214. H. H. Trepass. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, July 22nd, 1862.]

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| <i>July 16th.</i> | <i>July 19th.</i> |
| 1684. H. Cunew. | 1738. J. Gillott and J. Morrison. |
| 1724. J. Broadley. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, July 22nd, 1862.]

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| <i>July 16th.</i> | <i>July 18th.</i> |
| 1633. J. H. Johnson. | 1629. D. Fiskien & T. R. H. Fiskien. |
| | 1640. H. D. P. Cunningham. |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4494	July 12	{ Fastening for Porte-monnaies and other cases }	Christian Weinhand, jun. ...	Offenbach-on-the-Maine.
4495	" 17	The Concavoterminal Cigar	Henry Binnell Harris ...	Birkenhead.
4496	" 19	The Lever-binged Bag Frame	William Orth and Company.	15, Chiswell-street, E.C.
4497	" "	Improved Steam Trap	William Oxley and Company.	Manchester.
4498	" 22	Sugar Tongs and Cutter	Joseph Orchard	Birmingham.

Journal of the Society of Arts.

FRIDAY, AUGUST 1, 1862.

INTERNATIONAL EXHIBITION of 1862.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate of £452,100, have been attached to the Deed.

SEASON TICKETS.

Season Tickets may be obtained at the Society's House, on application to Mr. S. T. Davenport, Financial Officer. The prices of the tickets are as follows:—£2 10s., admitting to the International Exhibition and the Gardens of the Royal Horticultural Society every day during the remainder of the season; £1 10s., admitting to the Exhibition only, every day; and 10s., admitting to the Exhibition on shilling days only.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October.

ARTISTIC COPYRIGHT.

The Bill, with amendments inserted by the House of Lords, has now passed, and received the Royal Assent on Tuesday last.

NOTICE TO INSTITUTIONS.

A limited number of copies of a work entitled "The Iliad of Homer, faithfully translated into un-rhymed English Metre," by Francis W. Newman, Professor of Latin, University College, London, has been kindly presented by the author to the Council of the Society of Arts, for distribution amongst such Institutions in union with the Society as may desire to add this work to their Libraries.

Any Institution desiring to have a copy, should apply to the Secretary of the Society of Arts.

Those Institutions who have already applied, are informed that copies will be sent as soon as they are received from the publishers.

NEW SOUTH WALES.

The following paper forms the introduction to the Special Catalogue of the products of this colony shown in the International Exhibition:—

The eastern part of Australia was discovered by Cook in his first voyage in 1770. The bold character of the coast, and the broken outline of inland mountain, seen from the deck of the *Endeavour*, recalled to his recollection the well-known features of South Wales, and suggested the somewhat infelicitous, but now familiar, name of New South Wales. On the 26th of January, 1788, the first settlers, 1,030 in number, landed at the head of Sydney Cove, in Port Jackson, and the governor, Captain Arthur Philip, R.N., proclaimed the limits of the new colony to be—

On the east, the ocean from South Cape, in S. lat. 43° 40' to Cape York in S. lat. 10° 42'. On the west the 135° of E. long. On the north and south, the ocean.

Since that period various portions of the vast territory comprised within these limits have been cut off from the parent colony and formed into the following distinct dependencies, viz.:—The island of Tasmania in 1803, separated from the mainland by the straight which Bass first discovered in 1798; South Australia in 1836; Victoria in 1851; and Queensland in 1859. The colony of New South Wales has thus, by these successive curtailments, been reduced within limits comparatively narrow, but still comprising an area of 207,000,000 acres, defined by the following geographical discoveries:—

On the east, the sea from Cape Howe (S. lat. 38° 31') to Point Danger (S. lat. 28° 8'), forming a seaboard of upwards of 700 miles.

On the south, from Cape Howe, a line north-westerly to the source of the River Murray, and by the north bank of that river to the 141° E. longitude (the eastern boundary of South Australia).

On the west, by a line north along the 141° east longitude to the 29th parallel of south latitude.

On the north, from Point Danger a line westerly by a mountain chain, to the great dividing range; following this range to the 29° S. lat., thence by a lesser hill-chain to the River Severn, along its course to the River Macintyre, and by this river until it again reaches the 29° S. lat., and thence by this parallel westward until it reaches the 141° longitude.

It would on the present occasion be out of place to enter into a detailed history of the rise and progress of this colony; but it is felt that a general account of the present stage of its development, its population, its natural products, its industrial resources, and its commercial operations, will be read with interest, and will be considered an appropriate introduction to the catalogue of its contributions to the International Exhibition of 1862. The statistics, however, of New South Wales proper would give a very imperfect idea of the results which the original settlement in that colony in 1788 have produced in the short space of 72 years, ending the 31st of December, 1860; for three of the four colonies above mentioned spring directly from that event, and even South Australia, which derives its origin from an independent source, owes one of its staple exports and its supplies of animal food to the abundance of New South Wales; it is not, therefore, historically untrue to include in a statistical estimate of that event all the results which have been accomplished within the territory originally assigned to that colony; these are—

An aggregate population of	... ..	1,124,477
An aggregate revenue of	... ..	£5,170,563
An aggregate import and export trade	... ..
(real colonial value) of	... ..	£47,367,126

With this observation we may now pass on to the special statistics of New South Wales, the facts of which have been furnished by Christopher Rolleston, Esq., the registrar of the colony.

I. POPULATION.

1. The population on the 7th April, 1861, was 350,860 souls (198,488 males and 152,372 females), exclusive of the military and aboriginal inhabitants. The subsequent increase by births and by immigration will probably bring the numbers at the end of the year up to 360,000, about 205,000 males, and 155,000 females, the proportion being about 75 females to every 100 males.

2. The total area of New South Wales is computed at 323,437 miles, or 207,000,000 acres; that is, more than five times the area of England and Wales, and more than three times the area of England, Wales, and Scotland united. By the census of 1851, the quantity of land in England and Wales to every 200 persons living was 373 acres. By the census of 1861, there were in New South Wales 575 acres to each person—that is, in the colony the proportion of land to population is 310 times greater than it is in England and Wales.

3. The county of Cumberland—the metropolitan county—inclusive of Sydney, averages about 86 persons to a square mile; but, exclusive of Sydney, only 47 persons to a square mile. The average of the nineteen settled counties is rather under four persons to a square mile, whilst the extensive pastoral districts average barely one person to four square miles.

Without exceeding the density of the population as it exists in the county of Cumberland, exclusive of Sydney, New South Wales would admit of a population exceeding fifteen millions of souls, or nearly forty-four times the number of its present inhabitants; and were the colony peopled as densely as England, it would contain 103,500,000 inhabitants.

4. The city of Sydney contains 93,686 inhabitants (viz., within the city, 56,394, and in the suburban districts 37,292), or rather more than one-fourth of the total population of the colony. There are 10,185 occupied houses in Sydney, besides stores, public offices, and other buildings. The annual rental of the rateable property, exclusive of public buildings, and crown and vacant lands (estimated at a quarter of a million annually), is assessed at nearly three-quarters of a million, and of the suburban municipalities at nearly half a million* sterling. The annual rate raised upon this property exceeds £50,000.

5. The average annual number of births, since the establishment of a civil registry in the year 1856, has been 41 to every 1000 of the population, whilst the average of England and Wales for the year 1859 was 34 per cent. The average annual number of marriages in New South Wales has been 92 per cent., or nearly 10 to every 1000 of the population. The average of England and Wales for the year 1859 was about 8·4 per 1000.

The average annual mortality during the same period in New South Wales has been at the rate of 17 per 1000 of the population. In England the average for 1859 was about 22 per 1000.

In England the summer quarters of the year, and in New South Wales the winter quarters, are more prolific in births. In England the winter months are the most fatal to life, in New South Wales the summer months exhibit the highest rate of mortality.

6. There were in the colony 53,509 married women, and the number of births in 1860 was 14,233, which gives a proportion of 266 to every 1,000 married women of all ages, whilst in England and Wales the proportion in 1851 was 204 births for every 1,000 married women of all ages.

One of the most important facts brought out by the census of a population is the number that belongs to every age of life; for its relative powers of increase and production depend in a great measure on the proportion of maturity to infancy and decline of natural vigour. In New South Wales, by the census of 1861, there were between the ages of 15 and 45, 168,068 persons (viz., 96,065

males and 71,993 females), or 479 per 1,000 of the total population, whereas in Great Britain (that is England, Wales, Scotland, and adjacent islands), according to the census of 1851, the proportion between the same limits was 458 to every 1000 of the population. For the sake of comparison we may take another period, viz., from 20 to 60. In Great Britain in 1851, the numbers between these ages were 477 in every 1000 of the population, while in the colony in 1861 the proportion was 499 to every 1000. In both cases the comparison as regards physical strength is in favour of the colony. In the English census of 1851, the population of Great Britain was fancifully divided into three classes—the ineffectives, the self-supporting, and the effectives—the ineffectives being those under 10 and over 70, the self-supporting being those from 10 to 20, and from 60 to 70, and the effectives (that is those who not only support themselves but sustain the ineffectives) ranging between the limits of 20 and 60. Out of every 1000 of the population these three classes stood to each other in the following proportion: = 298 : 225 : 477. When the colonial census for 1861 is completed, this classification will afford another salient comparison; at present we are only able to state that in every 1000 of the population, there were 499 effectives to 501 ineffectives and self-supporting.

7. In a country extending over nearly 11 degrees of latitude, and of such varied elevation, great differences of temperature must exist. From observations registered at ten stations in different parts of the colony, it appears that the mean annual temperature ranges from 40° to 75° Fahrenheit. The extreme range, however, in inhabited places shows a wide divergence from these mean levels; the maximum summer heat in some island districts reaching at times 120°, whereas on the high table-lands severe frosts are experienced for some weeks in succession. The climate of Sydney, which is only a few miles from the seaboard, has been not inaptly compared to that of Naples, the difference being only 5° of greater summer heat and winter cold at Naples than at Port Jackson. But changes of temperature are much more violent in the latter locality than in the former, a sudden rise or fall of 30° being of not unfrequent occurrence in the summer season.

The rainfall during the year 1860 over the whole colony averaged 43 inches, the smallest quantity falling in the interior (18 inches), and the largest quantity at Sydney (82 inches). The average number of days upon which rain fell was 124; the smallest number being 64, at Deniliquin, and the largest 182, at Sydney.

The year 1860 has been taken because the returns are more complete for that than for preceding years; but it should be noted that it was a year of unusual wet in the coast districts. The average for a decennial period would probably be very much below what has been observed for the year in question.

II. OCCUPATION.

8. The chief occupations in which the people are engaged may be classed under six heads, viz:—

1. Government, Professional, and Trading Classes	Males	13,345		
	Females	2,293		
		15,638	or	4·46
2. Manufacturing and Labouring Classes	Males	31,501	„	8·98
3. Gold-mining	*Males	20,365	„	5·80
4. Pastoral and Agricultural Classes	Males	46,916		
	Females	7,084		
		54,000	„	15·39

* The municipalities without the city limits assess vacant lands; whereas, within the city, all public buildings and unoccupied lands are excluded from assessment.

* Of the 20,365 persons engaged in gold-mining, 12,600 are Chinese.

5. Personal Offices, Domestic Servants, &c.	Do-	Males 13,683 Females 14,490
		28,173 „ 8-03
6. Miscellaneous, including Women and Children, both at Home and at School.	{	Males 72,678 Females 128,505
		201,183 „ 57-34

III.—PRODUCTION.

9. Of the whole of the Australian colonies, New South Wales takes the lead in pastoral industry. The live stock returns on the 31st March, 1861, exhibited the following numbers, viz.:—Sheep, 6,119,163; cattle, 2,408,586; horses, 251,497. This is at the rate of *seven hundred head* of horned cattle, and rather more than *seven hundred* sheep to every hundred of the population.*

From New South Wales the flocks and herds of all other colonies derive their origin. In 1797 Capt. John Macarthur of Camden, (a name which must ever occupy the front rank of honour in the annals of Australian progress), being struck with the remarkable effect of the climate of New South Wales on the fleeces of the sheep which had been imported into or bred in the colony, obtained from the Cape of Good Hope three rams and five ewes of pure Spanish merino blood, and crossed all his coarse-woolled ewes with the Spanish rams. The result exceeding his most sanguine expectations, he took an opportunity whilst in this country in 1803 of bringing under the notice of the government the importance of encouraging the growth of fine wool in the colony by making grants of unoccupied lands to the flock masters. The concluding words of his statement, laid before Lord Hobart (then Secretary of State for the Colonies) in 1803, are worth recording:—

“Captain Macarthur is so convinced of the practicability of supplying the country with any quantity of fine wool it may require, that he is earnestly solicitous to prosecute this, as it appears to him, important object; and on his return to New South Wales, to devote his whole attention to accelerate its complete attainment. All the risk attendant on the undertaking he will cheerfully bear—he will require no pecuniary aid—and all the encouragement he humbly solicits is, the protection of government, and permission to occupy a sufficient tract of unoccupied land to feed his flocks.”

In 1796 the whole of the live stock in the colony, exclusive of goats and pigs, was 57 horses, 227 cattle, and 1,531; and from this stock have sprung the vast flocks and herds which were feeding on the natural grasses of Australia at the end of 1860, as exhibited in the following table:—

Colony.	Sheep.	Cattle.	Horses.
New South Wales	6,119,163	2,408,586	251,497
Victoria	5,794,127	683,534	69,288
Queensland	3,449,350	432,890	23,504
South Australia.....	2,824,811	278,265	49,399
Tasmania	1,700,930	83,366	21,034
General Totals	19,888,381	3,886,641	314,722

10.—The export of wool from Sydney in 1860 amounted to 12,809,362 lbs. of the estimated value of £1,123,699 sterling. Besides this a considerable quantity crossed the Murray River for shipment at Melbourne, and was sent down the Darling for shipment at Adelaide. In the last ten years (1851 to 1860) there have been exported from Sydney, the produce of the flocks and herds of New South Wales, no less than 158,958,055 lbs. of wool, of the estimated value of £11,051,313, and tallow and hides of the

value of £1,663,183, together amounting to the sum of £12,714,496 sterling. Here is abundant evidence of the magnitude and importance to which the pastoral interest has attained; and to this sum should be added the value of the live stock exported to Victoria and elsewhere, amounting, as nearly as can be estimated, to not much less than half a million annually. Take the value, however, at a quarter of a million annually, in order to obviate any chance of exaggeration, and we produce a sum total of £2,500,000, which brings up the pastoral produce of the colony in the ten years to £15,214,496, or over a million and a half sterling per annum. The value of all other colonial produce exported—agricultural, manufacturing, and mining—including gold—does not approach this amount within nearly a million sterling.

11. The month of May, 1851, is remarkable as the era of the gold discovery in New South Wales. In that year the colony exported gold to the value of £468,336, in 1852 to the value of £2,660,946, in 1853 to the value of £1,781,172. In the five following years (1854 to 1858), owing to the superior richness of the Victorian discoveries, gold mining languished in New South Wales, the average produce not exceeding £600,000 per annum. In 1859, however, the yield increased to £1,698,078, and in 1860 to 1,876,049. In the ten years the colony has exported 3,281,000 ozs. troy, representing a value of £11,683,857 sterling.

12. The limits of the great coal field of New South Wales are at present imperfectly known; it is found to extend into Queensland, and to re-appear in Tasmania, but it has not been practically opened out in either of these colonies. The mines now in operation are situate at or in the neighbourhood of Newcastle, at the mouth of the Hunter, 60 miles north of Sydney, and at Bellambi, 43 miles to the south of that city. The total produce of coal in the last ten years has been 1,780,000 tons, of which more than one-half has been shipped to India, China, and the neighbouring colonies.

The present appliances of the collieries in work are equal to the production and shipment of 20,000 tons weekly, and the average price for good screened coal at Newcastle is 12s. to 14s. per ton.

Locomotive engines draw the coals along tramways from the pit to the shipping staiths, where steam cranes and other facilities are in action for the ready loading of vessels of large tonnage.

The further development of this great mineral resource is only arrested by the want of miners. If this want were supplied, there is no doubt that in the course of a few years this coal field would furnish gas and steam fuel throughout the Indian and Pacific Ocean. The quality of the coal from one of the pits was tested at the Royal Arsenal, Woolwich, in 1858, and again in 1859, and the results were highly satisfactory, showing that for steam purposes it is only 7 per cent. inferior to the best Welsh coal, and that, as regards the manufacture of gas, it produces upwards of 9,000 feet per ton, with an illuminating power 24 per cent. greater than the English variety known as Whitworth.

13. The returns of agriculture, taken on the 31st of March, 1861, give a total extent of land under cultivation of 260,798 acres. Of this quantity not quite one-half (128,829 acres) was sown with wheat; nearly one-fifth (51,488 acres) with maize, or Indian corn; another fifth with barley, oats, and artificial grasses for hay and green food for horses and cattle; and the remainder was appropriated to potatoes, vineyards, and orchards.

The average production of wheat is a little over fifteen bushels per acre; this is less than the average produce of Tasmania and of Victoria by three to five bushels, and rather above the average of South Australia. Except in seasons of extreme drought the colony has, on an average, raised rather more than one-half the quantity required for the annual consumption of its inhabitants. In the ten years (1851 to 1860) there have been imported of grain and bread stuff from South America, California, and South

* In Ireland, at the end of 1861, there were only 61 sheep and 60 horned cattle to every 100 of the population.—*Vide Agricultural statistics, Ireland.—Parliamentary Paper.*

Australia, to the annual average value of 370,000*l*. For the whole period a total sum of 3,701,256*l*. has been expended in the importation of bread stuff (including rice) for the support of the population. The production of wheat in 1860-1 was at the rate of 4½ bushels per head of the population, whereas the consumption per head may be reckoned at 7 to 8 bushels, including the quantity required for seed.

14. Maize is grown largely as food for horses, pigs, and poultry. New South Wales and Queensland are the only two of the Australian colonies which are adapted by climate to the production of this valuable cereal. The average production is rather over thirty bushels per acre.* It is largely exported to Victoria and the other colonies. No less than 559,226 bushels were shipped outwards last year, of the estimated value of 92,450*l*.

15. Much attention has of late years been bestowed on the cultivation of the vine and the manufacture of wine. There were last year in crop 1,583 acres, but 622 acres only were devoted to wine making. The produce was 99,791 gallons of wine and 709 gallons of brandy, or at the rate of about 110 gallons per acre.†

The wines of Australia are too well known to need any remarks here as to their character, and the samples which have been sent to the Exhibition will speak for themselves.

16. The instincts of race are already apparent in the gradual development of manufacturing industry. In 1860, 938 mills and factories were at work, the most important being those engaged in ship building and the manufacture of engines, hardware, cloth and tweeds, leather, soap and candles, refined sugar, and pottery. It may be doubted whether it is to the present advantage of the colony, that any portion of its available labour should be withdrawn from the field, which from climate and pastoral fertility is capable of supplying the old world with an indefinite quantity of raw material; but it must be borne in mind that, as New South Wales possesses to an unlimited extent every one of the mineral resources to which England, in a great measure, owes her wealth and national prosperity, it solely depends on the present direction of her own energies, whether she eventually becomes the manufacturing centre of the Pacific. It is well, therefore, that a commencement has been made, and that the intelligence of its population is already receiving the training and experience which are necessary for the fulfilment of its great destinies.

17. The introduction of alpacas into the colony by Mr. Ledger is worthy of special notice. It is found that the climate and pastures are peculiarly suited to the increase and the fleeces of these animals; and Mr. Ledger calculates that in fifty years the flock will have increased to 9,760,000, producing, at an average of 7 lbs. per head, a clip of 68,320,000 lbs. Let those who may be disposed to reject this estimate as extravagant, bear in mind the origin of the merino flocks of Australia. In 1807 the export of merino wool from Sydney was 245 lbs.; in 1861 the export from all the Australian colonies and New Zealand was upwards of 68,000,000 lbs.‡ The first export to England of alpaca wool was made in 1860, and amounted to 677 lbs.

IV. TRADE AND INTERNAL COMMUNICATION.

18. There are no features in colonial statistics calculated to impress strangers more strikingly than those which ex-

* On rich land 70 bushels per acre have not unfrequently been grown.

† The average produce of the vineyards of France is computed at 190 gallons per acre.

‡ The superiority of the average quality of Australian wool to the average quality of that which is imported from all other countries will be seen from the following statement:—In 1861 the total quantity of wool imported was, from Australia and New Zealand, 68,313,903 lbs., and from other countries 75,570,611 lbs., and the computed real value of the former was £5,477,181, or 1*s*. 7*d*. per lb., and of the latter £3,015,377, or 9*d*. per lb.—Vide *Trade and Navigation, 1861: Parliamentary Paper*.

hibit the trading activity of the comparatively small communities settled on the shores of the Australian continent.

The colonial real value of the imports into New South Wales in the year 1860 exceeded seven millions and a half sterling; this was at the rate of £22 2*s*. 3*d*. per head of the population estimated for the middle of the year.

During the last ten years (1851 to 1860) the colony has, on the average, imported annually from Great Britain alone goods to the value of £3,319,926, the aggregate sum reaching the enormous amount of £33,199,268.

The value of the general imports in these ten years amounted to £52,822,429, showing an annual average of more than 5 millions sterling.

19. The value of the exports during the same period is not less remarkable.

The total amount to Great Britain in this decennial period was £20,110,205, the annual average £2,011,020, whilst the general exports amounted to £39,327,726, giving an annual average of nearly 4 millions sterling.

The value of the exports during 1860 exceeded five millions sterling (£5,072,020,) being at the rate of £14 8*s*. 4*d*. per head of the population.

It may be worth noticing, that of the total exports during the ten years £29,848,252 or 73·35 per cent. was the produce or the manufacture of New South Wales.

These are the results of the trading of a community, which, in 1851, numbered only 197,168 souls, and in 1861 does not exceed 360,000.

The shipping employed in this trade in the year 1860 was,—inwards, 1424 vessels, of the tonnage of 427,835 tons, with crews numbering 23,833 men and boys,—outwards, 1,438 vessels of 431,484 tons, employing 23,941 men and boys.

20. There are 69 miles of railway in active work, constructed at a total expense of £1,317,840, that is at the rate of nearly £20,000 per mile. The total receipts for the year 1860, passenger and goods traffic, amounted to £61,738, or 4·70 per cent. on the original outlay.

There are 54 miles of railway in progress, and 222 miles projected, at an estimated cost of £2,666,864 exclusive of land.

21. There are 820 miles of main roads kept in order by the Government, and the amount expended in 1860 on roads and bridges, irrespective of those under the control of road trusts and municipalities, was £114,572.

The mileage of roads, not under Government control, has never been made the subject of official investigation, but the municipal expenditure (principally on roads) and the expenditure by the several road trusts in the colony amounted in 1860 to £37,935.

22. Telegraphic communication connects the capitals of the four colonies of Queensland, New South Wales, Victoria, and Australia; the extreme distance being 2,005 miles. Within the limits of New South Wales the telegraphic wires extend over 1,941 miles; the total cost of which amounts to £97,839.

23. The distance travelled by mail conveyance in the year 1860 was 1,461,518 miles.

The number of letters which passed through the General Post Office in Sydney was 4,230,761; of this number 349,670 were for town delivery, 3,012,345 were inland letters, and 868,746 were foreign letters. The total number gives an average of rather more than twelve letters to each person living in the colony in that year.

3,668,783 newspapers passed through the post office in the course of the year, of which 190,478 were foreign and 2,758,305 were colonial. The total number was at the rate of over ten per head of the population.

In addition to the letters and newspapers, 83,736 book packets and petitions went through the post, making a total of 7,983,280 distinct parcels in the course of the year.

The letter rate is 2*d*. per half-ounce, irrespective of distance; in 1860 the postal receipts were £45,612, and the expenditure £72,371.

V. PUBLIC REVENUE AND EXPENDITURE.

24. The total revenue of the colony in 1860, exclusive of loans, was £1,308,925; and the expenditure, including interest on loans, £1,312,777, being at the rate of not quite £4 per head of the population.*

Of the revenue the principal sources were—

	£	Per Cent
Customs, and Duty on Distilled Spirits ...	599,233	or 45·8
Export duty on gold, and Mint receipts ...	77,506	„ 5·9
Lands ...	312,863	„ 23·8
Rents and Licences (exclusive of land) ...	86,566	„ 6·6
Postage ...	45,636	„ 3·4
Fines and Fees ...	31,484	„ 2·4
Railway and Telegraphs ...	71,405	„ 5·4
Miscellaneous ...	84,223	„ 6·4

25. The tariff is remarkable for its simplicity, and with one exception (the export duty on gold) is consistent with sound principles of trade. All articles of foreign produce or manufacture are admitted free of duty, excepting the few consumed in “smoking and drinking;” these are fermented and spirituous liquors—tea, sugar, coffee, and chicory—tobacco and opium. Another feature in the tariff, is, that the trade is not hampered by those vexatious refinements of classification, which are still adhered to in England in the case of sugars, and have only been abandoned in the present session in the case of wines.

26. The present rates,† and the amount of duties paid under each head are as follows:—

	£	Per Cent.
Spirits—imported 7s. to 10s. per gallon } ...	345,726	or 53·8
Ditto, distilled in colony 6s. 5d. to 7s. }		
Wine—over 25 per cent. alcohol, 10s. per gallon }		
Ditto under do. 2s. „ }	35,480	„ 5·5
Beer—in wood 1d., in bottle 2d. „ }		
Tobacco 2s. per lb.; Cigars 3s. per lb. „ }	89,217	„ 13·9
Tea 3d. „ „ „ „ }	45,303	„ 7·0
Sugar—refined 6s. 8d., raw 5s. per cwt. „ }	71,602	„ 11·1
Treacle and Molasses 3s. 4d. „ }	7,641	„ 1·2
Coffee and Chicory 2d. per lb. „ „ }	4,261	„ 0·7
Opium 10s. „ „ „ „ }	42,635	„ 6·6
Export duty on gold 2s. 6d. per oz. „ „ }		

The revenue from customs duties on the articles above enumerated was at the rate of £1 17s. 9d. per head of the population.

26. In an earlier portion of this paper it has been stated that the total area of the colony is computed at 207,000,000 acres. Of this quantity 7,170,690 acres only have been alienated; this gives as nearly as possible an average of 20 acres per head of the population, and leaves 199,829,310 acres of which the fee is still in the hands of the crown.

In the last ten years (1851 to 1860), 1,062,658 acres of land have been sold at the aggregate price of £2,054,418, giving an average of £205,441 per annum.

About fifty million acres are held under lease by pastoral occupants, who pay a present rental of £155,000 per annum, being at the rate of not quite $\frac{3}{4}$ of a penny per acre.

By a colonial Act, passed in 1861, persons are allowed, under certain restrictions as to occupation and improvement, to select rural lands in any part of the colony at a fixed price of 20s. per acre; paying 5s. per acre down at the time of selection, and the remainder at the expiration of three years.

27. The amount of the public debt on the 31st of December, 1860, was £3,830,230, being at the rate of very nearly £11 per head of the population.

This sum is secured on the consolidated revenue of the country. The debentures are issued in sums not less than £100, having for the most part thirty years to run, and bearing interest at 5 per cent. per annum.

The money has been appropriated to railways and other permanent public works, for the most part of a reproductive character.

* Revenue £3 17s. per head; Expenditure £3 17s. 2d. per head.

† The duties paid in England on tea, sugar, and foreign manufactured tobacco of the same quality as that used by the masses in New South Wales, are severally 600, 250, and 475 per cent. higher than the colonial rates.

VI. WAGES AND CONSUMPTION.

28.* The present wages of skilled artisans are 8s. to 10s. per day, without board or lodging; and of farm labourers and shepherds, from £30 to £40 a year, with board and lodging. In the former class, the decline from the rates which ruled in 1854 is considerable, but the wages of persons engaged in agricultural and pastoral industry have suffered comparatively no diminution, and the demand is greater than the supply.

Female domestic servants get ready employment at wages ranging from £26 to £36 per annum.

29. If the artisan receives lower wages, he is in a great measure compensated by the diminished cost of living.

Bread, which in 1854 to 1856 ranged from 5d. to 6d. the 2lb. loaf, is now down to 3½d. Potatoes, which ranged as high as 20s. a hundredweight, are now down to 8s. Meat, which rose to 6d. and 7d. per lb., is now reduced to 3d. and 1½d. per lb., according to quality.

Rents have fallen at least 50 per cent., and, taking the expenditure of the family of an artisan, it may be said that the cost of living has been reduced by nearly one-half.

30. There were imported into New South Wales, and manufactured in the colony together, during the year 1860, 979,616 gallons of spirits, and there were exported 143,870 gallons, leaving 835,746 gallons for consumption, or nearly 2½ gallons to each head of the population.

Of wine, beer, and cider, the excess of imports over exports was 1,700,000 gallons, or an average of 5 gallons to each person—man, woman, and child—in the colony. This is exclusive of wine and beer of colonial manufacture.

31. With regard to tea and sugar, which are largely consumed by the great mass of the people, there were imported into the colony in 1860 no less than 4,937,454 lbs. of tea, and 22,521,124 lbs. of sugar; and there were exported 1,640,520 lbs. of tea, and 6,385,456 lbs. of sugar, leaving a residue for consumption of 3,296,934 lbs. of tea, and 16,135,668 lbs. of sugar, being at the rate of nearly 10 lbs. of tea and 47½ lbs. of sugar for each person in the colony.

VII.—ACCUMULATION.

32. At the end of the year 1860, the savings-banks in the colony (17 in number) showed a total balance of £557,196 14s. to the credit of 12,027 depositors, being at the rate of £46 6s. 7d. per head. Besides this sum there was to the credit of—

	£	s.	d.
Reserve Fund	55,179	0	0
Profit and Loss	8,973	3	0
Drafts unpaid.....	482	14	3

showing a total balance to the credit of these institutions of £622,371 11s. 8d. sterling.

The classification of depositors was as under:—

Not exceeding £20	5,167
From £20 to £50	2,604
From £50 „ £100	2,070
From £100 „ £200	2,003
From £200 „ £300	131
From £300 and upwards...	52

12,027

The rate of interest paid to depositors is at the rate of 5 per cent. per annum on balances of account withdrawn during the year, and 6 per cent. on deposits remaining in the bank; but no interest is allowed on any sum exceeding £100 deposited by one individual.

33. The coin and bullion in the mint, banks, and treasury, at the end of 1860, amounted to £1,647,265, and the notes in circulation to £949,849, making together, £2,597,114.

The coinage at the mint in 1860 was—1,573,500 sovereigns, and 156,000 half-sovereigns.

* A skilful coal-hewer could, at the current rate of wages, earn more than 18s. per day if his earnings were not restricted by the interference of the union clubs.

The total issue of coin by the Sydney branch of the Royal Mint, from its opening on the 14th of May, 1855, to the end of the year 1861, has been 7,333,500 sovereigns, and 2,202,500 half-sovereigns, the greater part of which is held in circulation through the Australian colonies.

At the termination of the last quarter of the year 1860, the liabilities in New South Wales of the different banking institutions were as follows:—

Notes in circulation	£949,849
Bills	62,504
Balances due to other banks .	304,277
Deposits	5,164,011

Total £6,480,641

The assets were—

Coin	£1,578,424
Bullion	90,052
Landed property	239,050
Notes and bills of other banks	60,960
Balances due from " "	179,914
Notes and bills discounted ...	5,780,700

Total £8,929,100

The paid-up capital of the banks was £5,804,600. The dividends for the year amounted to upwards of £800,000, or about 14 per cent. on the paid-up capital; and the amount of reserved profits at the time of declaring the dividends was—£1,258,201.*

The practice of allowing interests on fixed deposits, accounts for the large sum of £5,164,000 lying in the banks under the head of "deposits."

VIII.—EDUCATIONAL, CHARITABLE, AND RELIGIOUS ESTABLISHMENTS.

34. For the higher departments of education there are the University of Sydney, with its two affiliated residential colleges of St. Paul's and St. John's (the former for members of the Church of England, and the latter for Roman Catholics), the large Sydney Grammar School, and 388 private schools.

The University is governed by a Provost, Vice-Provost, and Senate. The buildings, still incomplete, have been erected at a cost of £60,000, granted by the State; and the University enjoys from the same source an annual subsidy of £5,000 by way of endowment. Professorships in the three departments of classical literature, mathematics, and experimental philosophy have been established; and in 1860, 32 students attended the lectures given by the eminent men who fill those chairs. Since the opening of the University 110 students have matriculated, and 47 have graduated; the degrees taking rank, by the gracious permission of Her Majesty, with those conferred in the English universities. Towards the two affiliated colleges, private munificence has contributed nearly £50,000, and the State has given £40,000, besides an annual endowment of £1,000, viz: £500 to each.

The Sydney Grammar School has been built at the public cost, and receives an annual subsidy of £1,500. In 1860 the number of pupils receiving instruction was 144. At the 383 private schools the number of resident pupils in 1860 was 9,318.

35. In addition to these schools the Public Treasury supports two systems of primary education—the Denominational and Irish National. In 1860 there were 264 Denominational schools with 15,267 scholars, receiving from the State a contribution of £20,031, and from other sources £12,465. In the same year there were 144 National Schools educating 9,305 scholars; receiving from the State £23,445, and from other sources £7,838.

36. Taking the whole of these establishments together, we find that in 1860, 34,769 scholars (about 1 in 10 of the

population) were receiving an education suited to their station in life, towards the expenses of which the State contributed the sum of £60,587, not far short of 5 per cent. of the whole public revenue of the colony, and at the rate of £1 14s. 11d. per scholar, the rate in England and Wales being 11s. 6d.

In addition to the above there are 329 Sunday schools, with an average attendance of 21,104 children.

In the large towns and populous districts of the colony, Schools of Art or associations for mutual improvement exist, and a sum of £25,000 has recently been voted by the Legislature for the foundation of a free public library in the city of Sydney—an institution much required, and already exercising the most beneficial influence in the sister capital of Melbourne.

37. The returns for 1860 show that there were 33 institutions established for objects of charity, such as hospitals, benevolent asylums, orphan and ragged schools, &c., &c., supported partly by State and partly by voluntary contributions, at a cost exceeding £50,000 per annum.*

38. The number of ministers of religion in 1860 was as follows:—Church of England—Bishops, 2; Clergy, 114; Total, 116. Roman Catholic Church—Archbishop, 1; Clergy, 59; Total 60. Presbyterians, 52; Wesleyans, 40; Independents, 12; Primitive Methodists, 8; Baptists, 5; Jews, 4; Unitarians, 1; Grand Total, 298.

Taking the estimated population at the middle of the year, this gives one minister to 1,140 persons. These ministers are supported partly from the public revenue which is charged with an annual payment of £28,000 distributed on a certain fixed scale, but principally from local voluntary contributions.

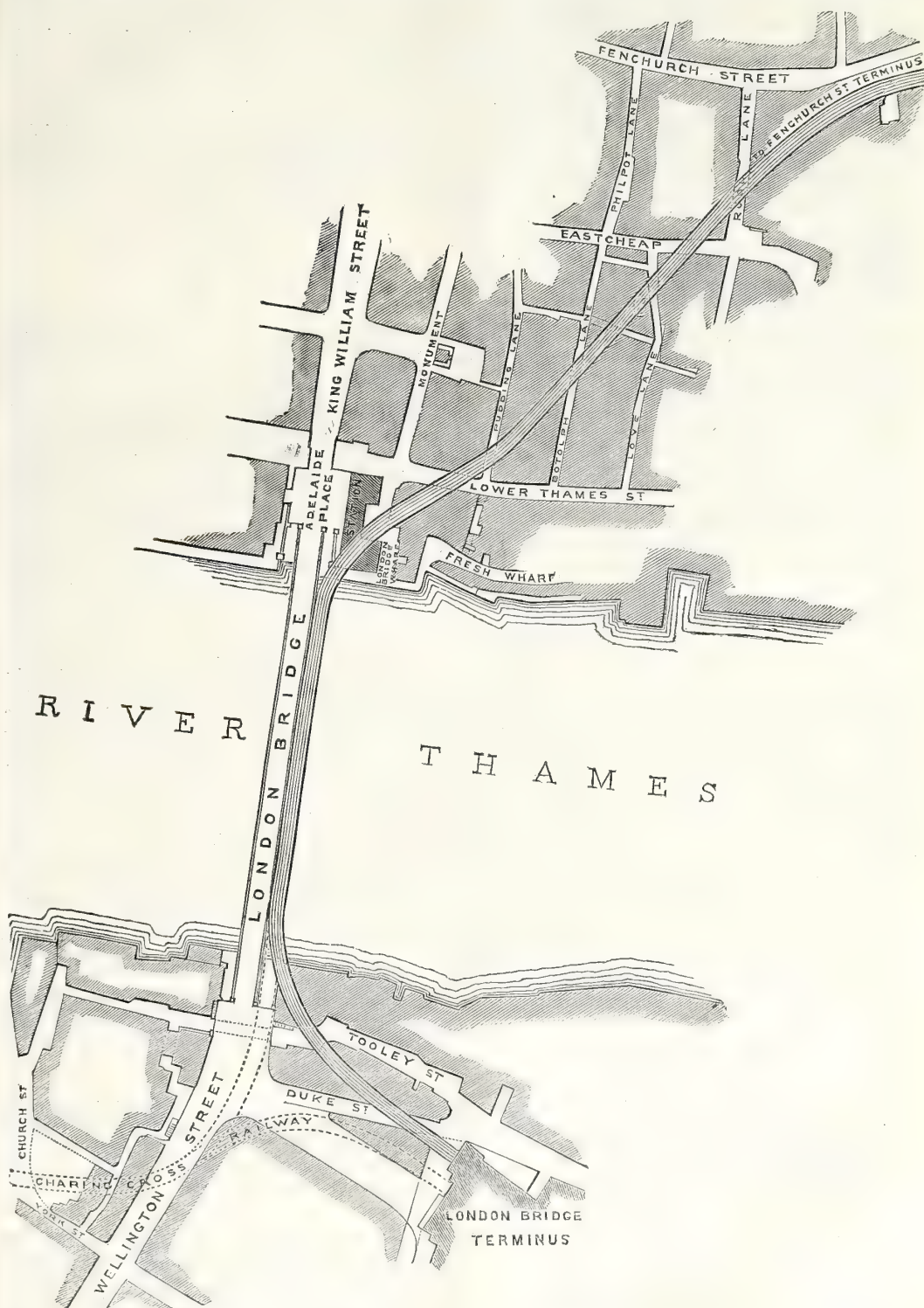
39. The large proportion inhabiting the metropolis, will not escape observation. The number of the inhabitants of London and its suburbs, in 1861, was 2,803,034 out of a total population of England and Wales amounting to 20,205,504; that is, out of every 1000 persons inhabiting England and Wales, 143 were to be found in the metropolis, whereas in New South Wales, the numbers inhabiting Sydney were 267 to every 1000 of the population. If the distribution of the population in England and Wales were in the same ratio, the population in London in 1861 would have been nearly 5,894,869. The great preponderance of the metropolis in the location of the colonial population is due to various causes, but principally to the immense amount of exportable produce, the small number of persons employed to raise it, and the enormous business at the port of shipment. Whether this monopoly of population by the metropolis, and this denudation of the rural districts, are signs of healthy progress, is a question full of interest. Those who look more to immediate results than to the gradual and simultaneous development of the various elements which constitute national stature, regard with unmixed satisfaction the maturity of the colonial metropolis—the complete division of labour, the organization of industry, and the mental activity produced by the aggregation of so large a portion of the population into one centre.

Under any view, however, of the facts above stated they are calculated to show that the colony of New South Wales offers a home of comfort and plenty to the surplus population of the old world. Millions of acres are open to free selection even before survey, and with deferred payment at a uniform price of 20s. per acre. The climate is unequalled for salubrity, wages are high, food is cheap and abundant, taxation is light, the educational and religious wants of the community are provided for, the laws are impartially administered, and the country is governed under a constitution analogous to that which the inhabitants of the United Kingdom regard as their indefeasible birthright.

* These figures would lead to erroneous conclusions, unless it is borne in mind that they represent the total amount of capital, dividends, and reserved profits, not only of the banks which are confined to New South Wales, but of those in which that colony forms only one part of their field of operation.

* Government	£37,683
Private	13,734
Total, 1860	£51,417

LONDON TRAFFIC.



At the conversazione recently given by the Society of Mechanical Engineers, in the Egyptian Hall, at the Mansion House, a very interesting model was shown by Mr. Asprey, illustrating an ingenious plan devised by that

gentleman for connecting all the railways north and south of the Thames, relieving London-bridge entirely of all traffic going to or from the various railway stations.

The wood-cut (see preceding page) shows the general features of the plan. Mr. Asprey proposes to run a line of railway from the London-bridge Station to the Fenchurch-street Station, crossing the Thames by the side of London-bridge on the east, with branch on the south side to the Charing-cross line, and a passenger station near the Monument, either with or without an hotel connected.

The through traffic might thus be accomplished without changing carriages. This plan would render unnecessary the bridge and extension from the Charing-cross line to Cannon-street, for which an Act of Parliament has been granted, and the works commenced, the same objects being obtained at an immense saving of cost, with the important advantages gained of not only carrying the West-end traffic into the City, but right through to the Black-wall and all other lines in connection without changing carriages, forming a connecting link between the whole system of railways North and South of London. This would entirely effect the one great necessity of the day, viz., the relief of the traffic of London-bridge. Not one person, or conveyance of any kind for goods or passengers, would be required to cross the bridge for either of the railways, whether the destination were far or near, home or continental; the stations remaining as they now are, with the addition of one new passenger station on the Monument side, between Thames-street and the River, or at any other more convenient point.

The goods stations in the Minories and at the Bricklayers Arms might remain the same, if both were required, all delay in the transmission of goods from one station to the other would be avoided, and much labour and money saved by sending all direct through by the rail. This would bring all fish (from either coast) direct to Billingsgate, and also give direct communication with Leadenhall Market, the Coal Exchange, Custom House, Mark-lane, the Borough Market, &c., &c., with easy access to the Bank of England, the Royal Exchange—indeed, affording great convenience to all parts, bringing the many thousands who go in and out of the City daily from the south side to a more central point, saving much valuable time, and avoiding the crowded and disagreeable walk, or ride, over London-bridge. This would also avoid the tedious journey from the West-end to the Fenchurch-street station, and relieve the City to some extent of the traffic.

The model, which is about three feet square, scale five feet to the mile, has recently been placed in the International Exhibition, Class 10, by the advice of several eminent engineers, and others, who have passed very high eulogiums on the plan, and believe that it would afford immense public benefits, questioning whether its importance is not worthy of consideration before proceeding further with the before-mentioned works just commenced.

EXAMINATION PAPERS, 1862.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(Continued from page 571.)

NAVIGATION AND NAUTICAL ASTRONOMY.

THREE HOURS ALLOWED.

One Question only in each Section to be answered.

I.

1. On February 3rd, 1862, in longitude $22^{\circ} 30'$ E., the observed meridian altitude of the moon's lower limb was

$60^{\circ} 27' 40''$, the index error of the sextant *minus* $20''$, and the height of the eye above the sea 24 feet. Find the latitude.

2. For May 17th, 1862, at 9 h. 45 m. 33 s., A.M., local mean time, find the sun's true altitude at a place in latitude $47^{\circ} 40'$ N., and longitude $36^{\circ} 15' 45''$ W.

II.

1. On April 7th, 1862, in latitude by account $52^{\circ} 20'$ N., and longitude $12^{\circ} 25'$ W., the mean of the observed altitudes of the sun's lower limb, very near noon, was $44^{\circ} 30' 40''$. The times of the several observations, indicated by the chronometer, were—

11 h. 2 m. 27 s.

2 43

2 59

3 22

3 57

The chronometer was slow, on apparent time, at the ship, 50 m. 18 s. The index error of the sextant *minus* $1' 20''$, and the height of the eye 20 feet. Find the latitude.

2. On April 19th, 1862, at 3 h. 15 m. 20 s., P.M., local mean time, in latitude $20^{\circ} 19'$ S., longitude $85^{\circ} 15'$ E., the sun bore by compass N., $52^{\circ} 51'$ W. Required, the variation of the compass.

3. January 3rd, 1862, at 10 h. 15 m., A.M., in latitude $51^{\circ} 25' 30''$ S., and longitude by account $143^{\circ} 25'$ E., the following lunar was taken:—

	Obs. alt. of Sun.	Obs. alt. of Moon.	Distance.
	$54^{\circ} 29' 50''$	$25^{\circ} 1' 50''$	$32^{\circ} 28' 50''$
Index error	— 3 13	+ 33	+ 1 21

Height of the eye 18 feet.

Find the longitude.

III.

1. Prove that the dip of the sea horizon varies directly as the square root of the height of the eye.

2. Demonstrate a formula for the calculation of the "reduction of the moon's equatorial horizontal parallax."

3. Explain the cause of the apparently elliptical form of the moon, when it is near the horizon, and its effect on lunar observations.

IV.

1. Find the compass course and the distance from A to B by middle latitude and Mercator's sailings:—

Latitude of A, $27^{\circ} 16'$ N.; Longitude, $55^{\circ} 20'$ W.

Latitude of B, $38^{\circ} 18'$ N.; Longitude, $51^{\circ} 30'$ W.

The variation of the compass $14^{\circ} 30'$ W., and the local deviation due to the position of the ship's head, $7^{\circ} 30'$ E.

2. A ship steams seven knots an hour, and her apparent course is W.N.W., what is her true course and distance in $5\frac{1}{2}$ hours, supposing a current drifting S.b.E. two knots per hour?

V.

Given two sides and their contained angle in a spherical triangle; demonstrate a formula for the direct computation of the other side.

2. Prove that in a spherical triangle—

$$\text{Cot. A Sin. B} = \text{Cot. a Sin. c} - \text{Cos. B Cos. c.}$$

VI.

1. Find the time which will be shewn by a chronometer which is fast for G.M.T. 3 h. 4 m. 52 s., when the sun is on the meridian of 45° W., on May 1st, 1862.

2. Find the meridian distance of Capella at 8 h. P.M., June 7th, 1862, for a place 90° East of Greenwich.

VII.

1. Investigate the method given in the "Nautical

Almanac" for finding the latitude by means of altitudes of the Pole-star.

2. Investigate the formula for computing the "reduction to the meridian" of altitudes taken near the time of a star's transit.

VIII.

1.—Give the principles of the construction of Mercator's chart.

2. Describe the method of navigating by great circle sailing.

3. Describe the adjustments of the sextant.

PRINCIPLES OF MECHANICS.

THREE HOURS ALLOWED.

1. Define force. How is it measured statically, and how dynamically?

2. Find the resultant of two parallel forces acting in the same plane on a rigid body. Two parallel forces, which are as 3 to 5, act on a line, in opposite directions, at a distance of 12 inches; required the magnitude and position of the third force which will balance them.

3. State and prove the conditions of equilibrium of forces applied in any manner to a lever. What are the respective weights borne by two men who carry a burden of 200 lbs. slung from a pole 4 feet long, the weight being 6 inches from the middle?

4. Investigate the ratio of power to weight on the inclined plane, and hence show under what circumstances the mechanical advantage is greatest. A power of 50 acts at an angle of 45° with the incline of a plane, whose height is to its length as 1 to 2; required the weight which it will support.

5. What are the conditions requisite for the equilibrium of a vertical frame-work of jointed beams?

6. Show how to express the motion of a body on an inclined plane.

7. A body is projected up an inclined plane, whose height is $\frac{1}{3}$ th of its length, with a velocity of 50 feet per second; find its place and velocity after the lapse of 6 seconds.

8. If a body describe an ellipse under the action of a central force tending towards a focus of the ellipse, then the force varies inversely as the square of the distance.

9. Show how to find the limits within which the velocity of a fly-wheel varies, when the force of the piston is constant.

10. State the difference between the effects of a pressure applied to a solid and a fluid respectively. What hydrostatical facts result from this difference?

11. Explain the meaning of the terms "whole pressure," "resultant pressure," on a surface immersed in a fluid. Find the amounts of these two pressures on a globe, 1 foot in diameter, just immersed in a trough of mercury, whose specific gravity is 13.58.

12. Describe a fire engine, and explain its mode of working.

13. Show how the barometer is used to ascertain the heights of objects. What corrections are used in the calculations, and on what grounds are they introduced? Illustrate your remarks by a case of your own supposition.

PRACTICAL MECHANICS.

THREE HOURS ALLOWED.

1. Describe Newcomen's atmospheric steam-engine, and explain the method of working it. What radical defects are inherent in an engine of this description?

2. State briefly the principal improvements which have

been introduced by Watt into the construction of the steam-engine.

3. Sketch the slide-valve commonly used in locomotive engines, and explain its action. What is the meaning of the terms, "lap," and "lead," as applied to a slide-valve?

4. Describe some form of equilibrium valve.

5. Explain any arrangement of mechanism suitable for actuating the slide-valve of a steam-engine.

6. Describe in general terms the construction of a "lathe." What is the principle of the slide-rest? How is the slow motion given to the mandril of a lathe?

7. Explain the use of change-wheels in a screw-cutting lathe.

8. In a machine for planing iron, mention some of the methods employed for imparting a reciprocating motion to the table, and point out which of these methods allow of the motion in one direction being made more rapid than that in the other.

9. In the operation of drilling, the spindle which carries the cutter revolves, and at the same time advances slowly in the direction of its length; how can this movement be obtained in a self-acting drilling-machine?

10. Describe the anchor-escapement, and point out its use in a clock.

11. Explain the contrivance known as "Hooke's universal joint."

12. It is often desirable to record, mechanically, the number of impressions taken in a printing-machine: in what manner may counting-wheels be constructed and arranged so as to effect this object?

ELECTRICITY, MAGNETISM, AND HEAT.

THREE HOURS ALLOWED.

1. Explain the poles of a magnet, and state their properties.

2. Can magnetism be justly called an attractive force? Prove your answer by experiment.

3. Explain the best mode of constructing a mariner's compass, and the kind of error of deviation that may be thereby avoided.

4. State the three elements of the earth's magnetic force, and the means by which their changes have been observed and recorded.

5. Describe the peculiar magnetic properties possessed by the metal *bismuth*.

6. Explain the kinds of electricity, and the means by which they may be respectively recognised.

7. Distinguish between an electrometer and an electroscope. Describe the construction of Coulomb's torsion electrometer.

8. When the free electricity of any body is disturbed by the proximity of an electrified body, what is the action called? Give some experimental illustration.

9. Explain the theory of the different effects produced, when a point, or a knob, is presented to an electrified body.

10. State the conditions on which the efficiency of a lightning conductor depends.

11. Describe the origin and nature of a voltaic current, and the actions which take place in the battery-cell.

12. Explain the construction and relative advantages and disadvantages of the batteries of Daniell, Smee, and Grove.

13. What is the construction of the apparatus for obtaining electricity of high tension, by the agency of a voltaic current?

14. Explain the construction and use of Wheatstone's magneto-electric telegraph.

15. What is the nature and construction of the apparatus by means of which the most delicate experiments on heat may be made?

16. State your opinion of the nature of heat, and your reasons for it.

17. Describe and illustrate the various modes of transmission of heat.

18. Explain and illustrate by experiment the relations between the radiation and absorption of heat in gaseous bodies, and show the importance of the principle in the conservation of terrestrial heat.

19. Explain, and illustrate by some experiment, the specific heat of bodies.

20. Explain the phenomena of evaporation, the formation of dew, and the construction of the *cryophorus*.

(To be continued.)

Home Correspondence.

SUBMARINE EXPLOSIVE SHELLS.

SIR,—Never, in the changes of engines of war, has there been a period so perplexing as the present, in the adoption of destructive inventions to which we have been helped by modern appliances.

So great a change has been brought about since 1815, that those to whom our national defences are entrusted know not what course to pursue that shall best conduce to the safety of England and to the supremacy of her navy.

In this state of indecision, I venture to express a confident belief, due to a long study of the subject, that submarine explosive shells will, in some form, supersede to a great extent the employment of cannon in naval warfare. And in order to save a further waste of skill and labour upon monster war vessels and cannon, I do most earnestly advise that one of our worthless line-of-battle ships be turned adrift, under sail, in the North sea, and there experimented upon by a fast steamer armed with submarine explosive shells, variously charged, in order to ascertain what charge of gunpowder or other explosive agent is necessary to bilge a ship to such an extent that she may either slowly or immediately sink.

We have hitherto directed our attention solely to the top-sides of ships; but the day is not far distant when ships' bottoms, not their top-sides, will have to endure the destructive capabilities of an arm vastly superior in naval combat to any gun which can be used on shipboard.

I am fully aware that this is a subject extremely distasteful to us gentlemen in the profession of arms. "What is to become of us if such infernal contrivances come into use?" I would reply, what is to become of England and her supremacy on the seas, if she be forestalled by a foe who may have no regard for chivalrous and antiquated notions of warfare? Is the prediction of one of our best authorities, now no more, upon engines of war to be verified? "England will be compelled to adopt the submarine explosive shell when she shall, to her cost, have had experience of its destructive capabilities." But, nevertheless, it is the arm, of all yet known, the best adapted to the defence of insular England.

I am, &c.,

JOHN HARVEY, CAPT. R.N.

Cheltenham, July 28th.

CONDENSED AIR FURNACES.

SIR,—In the letter on this subject which you did me the honour to insert in your last number, considerations of space prevented me from adverting to the experiments already tried, and the facts thereby ascertained respecting the effects of combustion in condensed air. I will now, with your permission, supply the omission.

Sir Humphry Davy, in his papers upon "Flame," first published in the Philosophical Transactions for 1817, mentions the results of some experiments he had tried by burning different combustibles, both in rarified and condensed air. The latter, he observed, "presented con-

siderable difficulties," but were sufficient to show "that as rarification (for certain limits at least) does not diminish considerably the heat of flame in atmospheric air, so neither does condensation considerably increase it." This is but the expression of a law now well established—namely, that if the combustion is perfectly accomplished, the absolute quantity of heat evolved is the same under all circumstances. With regard to light the case was different. "The intensity of the light of flames in the atmosphere is increased by condensation and diminished by rarification, apparently in a much higher ratio than their heat, more particles capable of emitting light existing in the dense atmosphere." Sir H. Davy did not pursue this part of the subject far, his practical object at the time being to prosecute the researches which finally led to the invention of the safety lamp.

Between 1817 and 1859 no further experiments of any scientific value were instituted on this point. M. Triger, a French engineer, charged with the execution of some subaqueous works on the Loire, reported, indeed, in 1841,* that ordinary candles, burning under a pressure of three atmospheres, consumed very fast, and emitted "*une fumée épouvantable*," so that he was obliged to have the wicks made of silk instead of cotton. But his observations went no further, and probably from want of time he did not follow up the inquiry which the phenomenon suggested.

It is to Dr. Frankland that we owe nearly the whole of our present information on this subject. That gentleman was the first to surround his experiments with the precautions, and conduct them in the manner that could alone endure the results with any really scientific certainty. His first trials were accomplished during an ascent of Mont Blanc. Dr. Frankland commenced by burning a series of stearine candles at Chamounix, noting the number of grains of material consumed in a given time, and afterwards repeating the experiment on the summit. He found that the consumption of the candles was nearly equal in both cases, the slight difference being probably attributable to the decreased temperature at the higher level, but at the same time he "was much struck with the comparatively small amount of light which they emitted. The lower and blue portion of the flame, which under ordinary circumstances scarcely rises to within a quarter of an inch of the wick, now (*i.e.*, on the summit of the mountain), extended to the height of an eighth of an inch above the cotton, thus greatly reducing the size of the non-luminous portion of the flame."[†]

Further experiments were afterwards tried in glass globes attached to exhausting pumps, and gave similar results, which Dr. Frankland, by very ingenious methods, succeeded in analysing and measuring. The progressive phenomena are highly curious. "During the diminution of pressure down to half an atmosphere (15 inches of the barometer), the chief alteration is the gradual invasion of the upper portion of the flame by the lower and non-luminous part. As the pressure sinks towards 10 inches of mercury, the retreat of the luminous portion of the flame proceeds uninterruptedly, but the shape and colour of the flame also begin to undergo a very remarkable alteration. The summit becomes more and more rounded, until at 10 inches pressure the flame assumes nearly the form of an ellipse, whilst the blue portion, which now comprised nearly the whole flame, acquires a peculiar greenish tint. Finally, at 6 inches pressure, the last trace of yellow disappears from the summit of the flame, leaving the latter an almost perfect globe of a peculiar greenish-blue tint."

This peculiar tint Dr. Frankland thinks ought to be assigned to the presence of incandescent nitrogen. He proceeds to set forth a number of tables exhibiting the gradual diminution of light from the flame burnt under diminished atmospheric densities, the mean result of the

* Annales de Chimie for 1841.

† Philosophical Transactions for 1861.

whole series being that about 5 per cent. of light is lost or gained by every fall or rise of one inch in the mercurial barometer. As Dr. Frankland states the case:—"Of 100 units of light emitted by a gas flame in air at a pressure of 30 inches of mercury, 5.1 units are extinguished for each diminution of one mercurial inch of atmospheric pressure." In extending his experiments in the other direction, that is to say, into denser air than the average atmosphere, Dr. Frankland, like Sir H. Davy, encountered "considerable difficulties," which it required much trouble and ingenuity even partially to overcome. The result is given in the subjoined table:—

Proportion of light at 30 in.	100
" " at 60 in. (2 atmospheres) 262	
" " at 90 in. (3 ditto) 406	
" " at 120 in. (4 ditto) 959	

Assuming, as from analogy we are entitled to do, that the intensity of light affords a measure for the intensity of heat, under corresponding circumstances, we may conclude from Dr. Frankland's experiments, that in an atmosphere of double pressure, the attainable maximum of heat is two-and-a-half times greater than the ordinary range; the increase in a pressure of three atmospheres being in the proportion of four to one, and in four atmospheres nine and a half to one. As these results entirely coincide with the deductions drawn from *à priori* and theoretical considerations, they may be accepted without misgiving.

As an illustrative fact, pointing in the same direction, I may refer to the circumstance, well known to iron masters, that the product of their furnaces is noticeably larger in winter, when the air is dense and cold, than during the hot months of summer. This difference sometimes extends to as much as 10 per cent. in the daily yield of pig iron from the same furnace, and by an equal consumption of fuel, although the condensation produced by cold is equivalent to only $\frac{1}{480}$ for every 1° of Fahrenheit.

Both Dr. Frankland and Sir H. Davy tried their experiments in glass globes, but were necessarily small in dimensions, in order to secure strength enough to resist the internal pressure. The difficulties of all sorts which were then encountered will altogether disappear in the condensed air-chambers which I propose to construct. Here the furnace itself, the gas flame, and other burning fuel, together with the apparatus required for experiments and the attendants thereupon, are included in an air-tight room, filled and supplied with air at any density that may be wanted. The manipulator, under these circumstances, can conduct his experiments under a pressure of three or four atmospheres, nearly, if not quite as freely as in the open air, and will be able to investigate a new and fertile field of scientific research. Besides the novel conditions of combustion and development of light and heat under these hitherto untried conditions, many new features will present themselves in other departments of inquiry. All fluids boil and evaporate at a higher temperature under increased pressures, and many curious phenomena will be elicited when the experimentalist is able to "try conclusions" with water at a boiling point of 260°, or even 300° Fahr., instead of 212°. Irrespective of all commercial uses, in the intensity of heat or economy of fuel, the employment of "condensed air" as I propose, promises to yield, not only a new field, but also a new instrument for philosophical research. I believe that I am not too sanguine in anticipating its adoption as a useful adjunct in the laboratory, as well as a serviceable agent for commercial purposes.

I am, &c.,

A. J. JOYCE.

15, Cambridge-terrace, Hyde-park, July 28, 1862.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par
Numb.

Delivered on 11th July, 1862.

572. East India (High Court of Calcutta)—Copy of the Charter, &c.

73. Parliamentary Proceedings—Report from Committee.

81. Corn and Grain, &c.—Accounts.

Delivered on 12th and 14th July, 1862.

384. Civil List Pensions—Paper.

385. Army (China)—Returns.

387. Channel Islands' Garrisons—Return.

389. Poor Relief (Lancashire, &c.)—Return.

390. Sugar Duties—Report from Committee.

391. Ocean Steam Mail Contracts—Return.

392. Navy (Shot-proof Ships)—Return.

394. Committee of Selection—Seventh Report.

271. Ecclesiastical Registries—Return.

382. Public Offices Extension Bill—Copy of Plan.

386. Army, Ordnance, and Navy—Returns.

395. Militia Estimates—Report from Committee.

393. Bankruptcy Act (1861)—Report from Committee.

201. Bills—Charity Commissioners' Jurisdiction.

202. " Queen's Prison Discontinuance (1862).

203. " Weights and Measures (Ireland) Act (1860) Amendment

(amended.)

Affairs in Mexico—Correspondence (Part 3.)

Delivered on 15th July, 1862.

100. Salaries, Pensions, &c.—Return.

374. Income Tax, &c. (Metropolis)—Return.

379. Poor's Rate Summonses—Return.

388. Income Tax (Kettering District)—Returns.

400. Expiring Laws—Report from Committee.

203. Bills—Judgments Law Amendment (Ireland) (amended by the Select Committee.)

204. " Night Poaching Prevention.

Public General Acts—Cap. 24, 25, 26, 27, 28, 29, and 30.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, July 25th, 1862.]

Dated 3rd May, 1862.

1307. H. Juhel, Bordeaux, France—An imp. in wheels. (A com.)

1316. G. Neall, Islington—Improved apparatus for obtaining and applying motive power, especially applicable to propelling carriages on common roads.

Dated 8th May, 1862.

1377. A. Bearne, 24, Union-street, Torquay—Imp. in the construction of boots, shoes, and goloshes, rendering them elastic to pressure.

Dated 19th May, 1862.

1517. A. V. Newton, 66, Chancery-lane—Improved machinery for splitting leather. (A com.)

Dated 14th June, 1862.

1767. J. Lancelott, Clifton-terrace, Birmingham—Imp. in the manufacture of ornamental chains from sheet metal.

Dated 21st June, 1862.

1836. A. F. Maigron, Marseilles, France—Imp. in machinery or apparatus for the manufacture of tow or oakum, and for winding off, carding, and spinning all kinds of fibrous fabrics.

Dated 24th June, 1862.

1855. J. Johnston, Paisley—Imp. in hats.

Dated 25th June, 1862.

1863. J. Whitham, Leeds—Imp. in the apparatus used in working oil and other hydraulic presses.

Dated 26th June, 1862.

1873. E. T. Hughes, 123, Chancery-lane—Imp. in regulating or moderating the movement of the keys of pianofortes. (A com.)

Dated 28th June, 1862.

1897. G. H. Hulskamp, 53, Chancery-lane—Imp. in pianofortes.

Dated 30th June, 1862.

1910. W. F. Murray, Glasgow—Imp. in the manufacture of stoneware bottles, and in apparatus connected therewith.

1912. W. Easton, Oakinellgate, Gateshead-on-Tyne, and G. Donkin, Bill Quay, Gateshead-on-Tyne—Imp. in lears or annealing chambers, and apparatus used in annealing glass.

Dated 3rd July, 1862.

1937. T. Turner, Fisher-street, and W. Taylor, Ashton New Town, Birmingham—Certain imp. in single and double breech-loading fire-arms.

1939. W. A. Gilbee, 4, South-street, Finsbury—An improved manufacture of blue colouring matter. (A com.)

Dated 7th July, 1862.

1956. C. Wessely, 22, Canterbury-place, Lambeth-road—Imp. in carriages.

Dated 8th July, 1862.

1961. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in wet gas meters. (A com.)

1963. J. Brown, Middleton, Lancashire—An improved motion for actuating the doffers of carding engines for carding cotton and other fibrous substances.

1865. C. Slatford, Cannon-street West—Imp. in trimmings, tufts, and other articles for ornamental and decorative purposes.

1966. J. Rigby, Suffolk-street, Dublin—Imp. in breech loading fire arms, and in extracting cartridges from such guns, and also in wind sights for fire-arms.
1969. H. Wethered, Bristol—Imp. in the construction of handles, latches, or fastenings for doors, gates, and windows.

Dated 9th July, 1862.

1970. W. L. Wiggington, 4, Clifton-cottages, Hammersmith—An improved method of, and apparatus for, curing smoky chimnies.
1973. A. Gilbey, Oxford-street—Imp. in apparatus for washing and cleansing bottles.
1975. J. Rhodes, Morley, near Leeds—Imp. in rag machines. (A com.)
1977. H. Eschwege, 14, Mincing-lane—Imp. in purifying wood and other vinegar.
1978. G. T. Bousfield, Loughborough-park, Brixton—Imp. in washing machines. (A com.)
1979. E. S. Hindley, Bourton, Dorsetshire—Imp. in apparatus used when circulating hot water for warming dwelling houses and other places, which apparatus may be used for cooling and condensing.
1981. S. V. Evers, 80, Lower Thames-street—Imp. in the preparation of beverages. (Partly a com.)

Dated 10th July, 1862.

1983. W. F. Reynolds, Commercial-road—An improved watch pendant.
1985. H. Kellogg, New Haven, U.S.—Imp. in breech-loading fire-arms and cartridges therefor.
1986. J. Mander, Birmingham—Imp. in crochet needles and crochet needle holders.
1987. A. Bonnell, Hethpool-street, Maida-hill—Imp. in churns. (A com.)
1989. E. J. Biddle, Grosvenor Hotel, Piccadilly—The use of petroleum or coal oil as fuel, and also for the machinery and apparatus to be employed for this purpose.
1991. J. Leeming, North Holme Mills, Bradford—Imp. in jacquard or index machines.
1992. D. Steele, Bunhill-row, Finsbury—Imp. in the method of flushing or distributing the water in pans or basins applicable to waterclosets, urinals, wash-hand basins, or other purposes.
1993. T. Farra, Manchester—Imp. in wearing apparel, called skirts or petticoats and frocks.
1994. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in braiding machines. (A com.)

Dated 11th July, 1862.

1995. J. R. Hill, 7, Duke-street, Adelphi—An improved governor for the engines of steam vessels.
1996. M. Cornall and E. Griffiths, Manchester—Imp. in doubling, twisting, and reeling threads and yarns of cotton and other fibrous materials.
1997. J. Waitman, Manchester—Imp. in machinery or apparatus for carding flax, tow, or other fibrous materials.
1999. J. Orr, Glasgow—Imp. in weaving piled fabrics, and in the machinery or apparatus connected therewith.
2000. J. Miller, Lambeth—Imp. in apparatus for steering ships and other vessels.
2001. W. Bliss, Chipping Norton, Oxon—Imp. in heating ores, and in generating steam, and also in the apparatus employed therein. (A com.)

Dated 12th July, 1862.

2002. C. E. Green, 13, Blandford-street, Portman-square, and J. Green, Windermere-cottage, Winchmore-hill, Edmonton—Imp. in breech-loading fire arms.
2003. J. P. Lees and J. Beard, Ashton-under-Lyne—Certain imp. in carding engines.
2005. J. Hunt, Queen's Mill, Preston—Imp. in the process of sizing and drying yarns or threads, and in the apparatus employed in such process.
2007. T. Hill, Hampton-house, Great Warley, Essex—Imp. in the arrangements employed for the protection of markers at rifle butts, and in the means employed in indicating the score and position of the shot and wiping out the shot mark.
2008. E. T. Hughes, 123, Chancery-lane—An improved system of winding or rolling silk thread on moulds or bobbins, and placing them in suitable boxes. (A com.)
2009. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for washing ores and minerals. (A com.)
2010. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the manufacture of hats. (A com.)
2011. Dr. P. Plassan, Tours, France—An improved orthopaedic apparatus for straightening the human frame.
2013. H. Barber, 60, Thomas-street, and H. De Gars, 34, Pomond-street, Sheffield—Imp. in rolling iron, steel, and other metals for cutlery tools and other purposes.
2014. Hon. W. E. Cochrane, Osnaburgh-terrace, Regent's-park—Imp. in railway fastenings.

Dated 14th July, 1862.

2015. E. Taylor, 167, Regent-street—Imp. in the manufacture of buttons.
2016. G. Lowry, Salford—Imp. in machinery for carding and cleaning cotton and other fibrous materials.
2017. W. E. Gedge, 11, Wellington-street, Strand—An improved portable or stationary steam lift and force pump. (A com.)
2019. C. Crossley and J. W. Crossley, Halifax—Imp. in means or apparatus employed in washing and finishing textile fabrics.
2020. S. Partridge, Darlaston, Staffordshire—Imp. in railway signals.

2021. P. Sanderson and R. Sanderson, Galashiels, Selkirk, N.B.—Imp. in the manufacture of woven fabrics, and in the machinery or apparatus employed therein.

2022. W. G. May, Glasgow—Imp. in apparatus for extending tables.
2023. P. A. L. Canoncat, Rue des Petits Peres, No. 50, Marseille—Imp. in filtering water, and in apparatus employed therein.
2024. G. Fawcus, North Shields—Imp. in building boats.
2025. F. M. Parkes, Plumstead, Kent—Imp. in the manufacture of gas for lighting and heating, and in apparatus employed in the said manufacture.

2027. R. Ridley, Morlue, near Leeds, and J. G. Jones, 4, Cambridge-villas, Battersea, Surrey—Imp. in machinery and apparatus for ventilating mines and other places.

Dated 15th July, 1862.

2028. A. Leslie, Turf, Aberdeen, N.B.—Imp. in apparatus for applying steam or other motive power to cultivate the soil, and to actuate wheeled carriages.
2030. J. Green, Newtown, Worcester—Imp. in the method and means of producing signals, and in the applications of the same, particularly to steam ploughs or cultivators.
2033. W. Dickens, Salford, and J. Hewitt, Manchester—Imp. in self-acting and hand mules employed in spinning cotton and other fibrous materials.
2034. C. E. Crawley, 17, Gracechurch-street, and F. Foster, 7, Ashley-crescent, City-road—Imp. in safety or miners' lamps.

Dated 16th July, 1862.

2036. B. Johnson, Chester, and E. H. Taylor, Coed Talon, near Mold, Flintshire—Imp. in rope wheels, cages, and trunks used for mines, collieries, and other similar purposes.
2037. G. T. Selby, Smethwick, Staffordshire—Imp. in apparatus for superheating in tubes and tubular articles, and machinery for the manufacture thereof.
2038. L. R. Bodmer, 2, Thavies-inn, Holborn—Imp. in apparatus for winding up watches and other time keepers. (A com.)
2039. W. Henson, Nottingham, and W. W. Clay, Sneinton, Nottingham—Imp. in knitting machinery, and in apparatus connected therewith.
2040. A. V. Newton, 66, Chancery-lane—An imp. in sewing machines. (A com.)
2041. C. Sanderson, Sheffield—Imp. in the manufacture of crinoline or crinoline steel.

Dated 17th July, 1862.

2046. J. G. Harkness, Birkenhead—An improved safety handle for winches, cranes, and other like machines.
2048. T. B. Daft, 2, Queen-square, Westminster—Imp. in the manufacture of mats, and other surfaces where vulcanised india-rubber is employed.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

2052. O. F. Morrill, Massachusetts, U.S.—A certain new and useful apparatus for generating heat for culinary or various other purposes—18th July, 1862.

PATENTS SEALED.

[From Gazette, July 25th, 1862.]

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|---|----------------------|
| July 25th. | 308. J. B. Payné. |
| 209. W. Orr. | 400. J. H. Johnson. |
| 229. J. H. Brierley. | 425. J. Combe. |
| 236. J. B. Harby. | 470. W. Ashton. |
| 243. G. Phillips, sen., and G. Phillips, jun. | 498. W. E. Newton. |
| 278. T. Cook. | 866. W. E. Gedge. |
| 282. L. Hill. | 1185. J. H. Johnson. |
| 290. G. Manwaring. | 1238. A. V. Newton. |
| 297. J. Webster. | 1350. J. H. Johnson. |
| 300. W. E. Taylor. | 1352. J. H. Johnson. |
| | 1592. W. Palmer. |

[From Gazette, July 29th, 1862.]

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| July 29th. | 299. D. Gallafent. |
| 249. W. Davies. | 211. A. C. Bamlett. |
| 257. H. Schatten. | 320. J. Tonkin, jun. |
| 262. P. Scheurweghs and A. J. A. H. de Boissierolle. | 328. W. Clark. |
| 264. E. H. C. Monckton. | 330. W. H. Bartholomew. |
| 269. W. Smith. | 339. M. A. F. Mennons. |
| 280. F. Riesbeck & W. Becker. | 356. W. Wood. |
| 284. C. W. Lancaster. | 378. M. A. F. Mennons. |
| 288. W. Clark. | 484. M. A. F. Mennons. |
| 293. J. L. Norton. | 606. T. Hack and A. E. Carter. |
| | 994. J. Whitehouse. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, July 25th, 1862.]

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|---------------------|---------------------------------|
| July 25rd. | 1747. E. Hunt and H. D. Pochin. |
| 1761. P. A. Viette. | 1765. J. Wood. |
| July 26th. | 97. C. A. Girard. |
| 1744. J. Scoffern. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, July 29th, 1862.]

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|---------------------------------|-----------------------|
| July 22nd. | 1860. V. Delperdange. |
| 1691. W. Weallens & G. A. Crow. | 1860. A. V. Newton. |
| July 23rd. | July 26th. |
| 1693. C. Schiele. | 1732. J. Hanson. |

Journal of the Society of Arts.

FRIDAY, AUGUST 8, 1862.

INTERNATIONAL EXHIBITION OF 1862.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate of £452,300, have been attached to the Deed.

SEASON TICKETS.

Season Tickets may be obtained at the Society's House, on application to Mr. S. T. Davenport, Financial Officer. The prices of the tickets are as follows:—£2 10s., admitting to the International Exhibition and the Gardens of the Royal Horticultural Society every day during the remainder of the season; £1 10s., admitting to the Exhibition only, every day; and 10s., admitting to the Exhibition on shilling days only.

The delivery of the Medals and Certificates of Honourable Mention to the Exhibitors cannot take place till after the close of the Exhibition, when it will be made at a public ceremony in the building, to which will be admitted the holders of all classes of season tickets (except those for shilling days), and the public on payment of £1 each.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s.; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

It is intended to publish the Reports during the present month.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October.

NOTICE TO INSTITUTIONS.

A limited number of copies of a work entitled "The Iliad of Homer, faithfully translated into un-rhymed English Metre," by Francis W. Newman, Professor of Latin, University College, London, has been kindly presented by the author to the Council of the Society of Arts, for distribution amongst such Institutions in union with the Society as may desire to add this work to their Libraries.

Any Institution desiring to have a copy, should apply to the Secretary of the Society of Arts.

EXAMINATIONS.

The Programme of Examinations for 1863 is now ready, and two copies have been sent to each Institution in Union and Local Board. Additional copies may be had gratis on application to the Society.

The Papers set at the last Examination are now published in the form of a pamphlet, which may be had of Messrs. Bell and Daldy, Fleet-street. Price Sixpence.

NATIONAL MEMORIAL TO THE PRINCE CONSORT.

The following papers, relating to the proposed National Memorial to the Prince Consort, have been laid before the International Fund Committee at the Mansion House. They consist of a second report on the subject by the small Committee nominated by the Queen, accompanied by a letter from the seven leading architects who had been requested to give an opinion as to the best means of carrying out her Majesty's wishes. Then follow the Queen's reply, through Lieutenant-General Grey, to the above mentioned Report, and a letter from Sir Charles Eastlake, on the part of the Committee, inviting certain architects, whose names are given, to furnish designs for the Memorial; to them are added the correspondence with the Commissioners for the Exhibition of 1851, in reference to the proposed site.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

We, the Members of the Committee appointed by your Majesty to consider the best means of giving effect to your Majesty's wishes in respect to a Memorial to His Royal Highness the Prince Consort, humbly beg leave to Report

to your Majesty the result of our further proceedings with reference to the matters committed to us.

In our First Report,* dated the 14th of April last, we stated the difficulties which we had experienced in the endeavour to fulfil the conditions on which your Majesty's original choice of an obelisk mainly depended, and our serious doubts as to the expediency of prosecuting that part of the proposed scheme.

Our subsequent proceedings have been partly dictated by a letter dated the 19th of April last, addressed by Lieutenant-General the Hon. Charles Grey to Sir Charles Eastlake, acknowledging the receipt of our First Report, inviting us to turn our attention to some mode, other than that first proposed, of effecting the great object in view, and communicating your Majesty's suggestion whether some eminent architects might not be advantageously consulted as to the means of combining with such other design the groups of statuary (among which a statue of the Prince would be prominent) mentioned in General Grey's former letter.

In reviewing the various schemes that have been offered to our notice during the general discussion of this subject, we had become aware that a large proportion of the public appeared to be desirous of connecting the intended monument with some institution intimately associated with the Prince's name.

The inquiry having been to a certain extent re-opened, we could not overlook this prevalent opinion. In directing our attention to it, our first object was, therefore, to ascertain what kind of Institution His Royal Highness had especially promoted or desired to see established; and then to consider whether the proposed Monument could be satisfactorily combined with such Institution.

General testimony, and, above all, His Royal Highness's own public declarations and acknowledged views, tend to prove that there was nothing he had more at heart than the establishment of a Central Institution for the promotion, in a largely useful sense, of Science and Art, as applied to productive industry.

While the Prince was ever zealous in furthering the objects of charitable institutions, while he took an active part in endeavouring to improve both the moral and material condition of the poor, his great purpose—combining a wise philanthropy with patriotism—was to devise means for affording to the skilled labour of the industrial classes the advantages of a scientific and artistic education, and, in so doing, to promote their own social welfare, together with the commercial prosperity of the country.

The chief occasion on which His Royal Highness expressed his views on this subject was in August, 1851, in a paper read at a meeting of the Commissioners for the first Great Exhibition, when the success of that Exhibition was no longer doubtful, and when it became a question how the surplus funds were to be employed. Many of the views contained in that memorandum are embodied in the second Report of the Commissioners, explaining the reasons which induced them to secure the ground between Brompton and the Kensington-road, known under the name of the "Estate of the Commissioners for the Exhibition of 1851."

The surplus funds of that Exhibition had, by the judicious counsel of the Prince Consort, been applied towards the purchase of the property referred to as a site for Institutions intended to promote a special object; that object, as defined in the second Report of the Commissioners, being "to increase the means of Industrial Education, and extend the influence of Science and Art upon Productive Industry."

When we consider that the spacious site above mentioned was secured for this purpose by the Prince's foresight and decision, when we look at the useful and popular institutions which are already rising into importance in various parts of its area, and when we remember that the whole, with its present and prospective national benefits,

is the consequence of that first Great Exhibition which owed its success to His Royal Highness's wisdom and perseverance, we cannot but feel that such visible results constitute in themselves a significant and appropriate Memorial to the Prince Consort; and that a monumental expression and record of His Royal Highness's admirable qualities could not be better associated than with so characteristic an example of their fruits.

These convictions led us to regard the estate referred to, with its actual establishments, considered as a whole, as the fittest Institution with which a Monument to the Prince could be connected.

It was at this stage of our proceedings that, in obedience to your Majesty's suggestion, we sought the advice and assistance of some of the most eminent architects. They, on their part, met our request with an earnestness worthy of the object, and proceeded without delay to the careful consideration of the question proposed. Their attention, as stated in their subjoined Report, was, in accordance with our instructions, first directed to the South Kensington Museum; but various difficulties soon became apparent, rendering the realization of the comprehensive idea which we desired to embody scarcely attainable on that site.

An examination of the unoccupied portions of the ground, and a reference to the Prince Consort's special recommendations suggested another scheme.

The second Report of the Commissioners for the Exhibition of 1851 dwells, in conclusion, on the want, at that time, not only of scientific and artistic instruction for the industrial population—a want, since the date of the Report, in a great measure supplied—but of "a centre of action" for men of science and art where the results of their labours could be communicated, "affording at the same time the means of establishing the connection between them and the public, which would secure permanent relations of reciprocal influence."

In a speech at the opening of the Midland Counties Institute, in November, 1855, His Royal Highness spoke of "a central point of union" which might give a "national organization" to all such establishments.

In his speech at the opening of the garden of the Horticultural Society at South Kensington, in June, 1861, His Royal Highness expressed a hope that it would, "at no distant day, form the inner court of a vast quadrangle of public buildings, rendered easily accessible by the broad roads which will surround them—buildings where science and art may find space for development."

We conceived that a hall forming "a central point of union" where men of science and art could meet, where the results of their labours, with a view to the special purposes before indicated, could be communicated and discussed, and where deputies from affiliated societies throughout the United Kingdom could occasionally confer with the metropolitan authorities, might be fitly recommended as marking, with the Monument, the general object of the institutions in their vicinity. We were the more induced to come to this conclusion, as establishments for special purposes connected with industrial education could hardly be proposed for a central situation. A hall, on the other hand, would, from its general character, harmonize with every kind of institution, and, while fitly occupying such a position, might, at the same time, form the commencement of buildings to be hereafter erected, for more definite purposes.

Having pointed out to the Committee of Architects this ground as a fit site for the proposed hall, we left the further consideration of the question in their hands. It was open to them to recommend that the monument should be in some part of the hall itself; or in the open space in front of it, between the hall and the road; or in Hyde Park, in an area corresponding in its central line with that of the actual and proposed buildings opposite.

Without entering into details requiring future consideration, we are prepared to submit our opinion that the committee of architects have come to a judicious decision.

* See present vol. of *Journal*, p. 371.

on this part of the question; nor can we hesitate to express our satisfaction with a result which appears to fulfil more than one important condition. By being placed in the park, the monument has a national character, while its position in relation to the estate sufficiently indicates the connection which we had regarded as an essential part of our general plan.

Had the monument been placed on the south side of the Kensington-road, it would have been so near the hall as to be overpowered by it; while, by being within the estate, it would have lost something of its public importance. The latter objection would have been applicable had it been proposed to place the statues within the building. We conceive, however, that that objection would not extend to placing within the hall a marble statue of the Prince, distinguished in its composition from the statue on the Monument itself.

The hall, besides its special use, would, with its corresponding lateral approaches to the Horticultural garden, constitute the principal front to the whole estate. It would also, on many accounts, be an essential accompaniment to the opposite monument, by completing the connection between it and the Institutions which now exist, or may hereafter be established near it. Still, we are aware that its erection, as part of the proposed scheme, must depend on the amount which may be contributed. We can, therefore, at this moment do no more than express our earnest hope that sufficient funds may be provided to ensure the completion of the hall.

Having communicated our views on this subject to the Commissioners for the Exhibition of 1851, we have the satisfaction of stating that they have been pleased to assure us of their readiness to reserve, for a reasonable time, a suitable site for the hall, of the extent required.

It will be apparent that the conclusion at which we have now arrived has reference merely to the site of the memorial and its connection with the institutions referred to; and an inspection of the plan which has been prepared will show that the effect of the whole is mainly dependent on the straightening of the public road, in itself a considerable improvement, but which can only be effected by taking in a few feet from the park. For this purpose, trifling as is the proposed alteration, an application must be made to Parliament for its sanction, which we cannot doubt will be readily given.

In humbly submitting this our report to your Majesty, we beg leave to state that should the scheme we have indicated meet with your Majesty's approval, we propose, in further fulfilment of your Majesty's wishes, to invite a certain number of architects to furnish designs for the general arrangement of the monument, as regards its height, magnitude, and architectural elements, and of the surrounding area. The general design which might, with your Majesty's sanction, be selected, would at the same time be open to subsequent modifications in its details to suit the conceptions of the sculptors, who, in conjunction with the architect ultimately chosen, would be commissioned to complete the work.

We humbly subjoin, as an appendix to this work, the report and plan of the committee of architects, to which we have above referred.

DERBY.
CLARENDON.
WILLIAM CUBITT.
C. L. EASTLAKE.

Westminster, 26th June, 1862.

Royal Institute of British Architects,
Conduit-street, 5th June, 1862.

DEAR SIR CHARLES.—The Committee appointed by the Queen "to advise her Majesty on the subject of the Memorial to the Prince Consort" having requested us, by a letter, dated 10th May, in obedience to a suggestion from her Majesty, to give an opinion as architects as to the best means of giving effect to her Majesty's wishes, we have the honour to state that we have fully considered the matter referred to us, and beg to report as follows:—

In your personal communication with us at our first meeting, you brought under our notice various ideas on the subject referred to us, which had occurred to the Committee; but by your letter of the 17th May to Mr. Tite, you were good enough to state that the Committee were desirous that "we should all consider ourselves free to make any suggestion we pleased, without reference to any special site or object," indicated to us in the conference to which we have adverted.

Being thus entirely free to present our opinion, we proceed, first, to take up the suggestions you offered, and which we believe were as follows:—

That the Memorial to the Prince Consort should be erected in connection with an institution of arts and sciences:—1st, as a distinct monument, in front of it, or in the centre of a quadrangle belonging to it; 2ndly, as a monument inside a hall of the building; or 3rdly, as a wing, or some other portion of the building, to be hereafter completed, at the cost of the public.

These suggestions naturally appear to point out the South Kensington Museum and Schools of Art, because that establishment was founded under the auspices of His Royal Highness; it received his constant personal attention, and his desire was to see it become a large central college of science and art.

There are many reasons why the Memorial might be erected with propriety and advantage in conjunction with such an institution, if the funds were already provided; but these questions arise:—viz., whether the nature and style of the Memorial could be safely assumed before the plan and design of the building for the institution had been finally determined? and 2ndly, whether it would be advisable to adopt such a Memorial before the Government and the House of Commons had sanctioned and voted the necessary funds for the buildings.

Considering all the doubts which at present exist with reference to the permanent extension of the buildings at South Kensington, and the difficulties and delays which would arise in the event of a recommendation by the Committee of such a project, it appears more desirable to erect the Memorial, not as a part of, or in immediate connection with a very expensive edifice not yet determined upon, but as an independent monument in Hyde-park, or near to the site of the Exhibition of 1851, or on some other more public and central site than South Kensington, according to the expectations which have been held out, and upon which many persons subscribed to the Fund.

The Memorial, if erected in conjunction with any large building or institution, would lose in individual grandeur and importance; it would be difficult to treat it otherwise than as a subordinate object even outside the building; and if placed within it would be seldom seen, and would not be the national monument immediately under the public eye, which most people are expecting.

The sum available for the Memorial is supposed to amount to between £50,000 and £60,000, which probably would not be more than sufficient for a work of art worthy of the nation, including the cost of forming a site to receive it.

Assuming, therefore, the propriety of erecting the Memorial as a "monument," and that it cannot be a monolith obelisk, the forms which suggest themselves are, 1st, an obelisk in several stones; 2ndly, a column; 3rdly, a Gothic cross; 4thly, a large group or groups of sculpture; and 5thly, a building: a statue of the Prince Consort being in any of these cases the most prominent object.

Respecting these various kinds of memorial, the following considerations arise:—

1. As it appears a monolith cannot be obtained, there is no especial reason for adopting an obelisk, which, to be effective, must be on a very large scale, and, if so, it would be more conspicuous and important than the Prince's Statue; and, further, an obelisk built up in several stones would only show an inferiority to the ancients.

2. The objections above-stated to an obelisk apply

almost equally to a column, or any erection of that description, except that on the summit of a column might be placed the Statue. But in such a position the figure would not be better seen than the Duke of York or Lord Nelson on their columns, and statues so placed have not acquired much favour with the public.

3. The objections to an obelisk, a column, or any erection of that description, apply also to structures in any style of architecture which would assume either of those forms.

4. With reference to a memorial composed of one or several groups of sculpture, surmounted by a statue of the Prince, the following considerations arise:—If in the open air, considering the climate of this country, it must be of bronze, and, if placed in Hyde Park, it must be upon a very large scale to be effective. We admit that bronze, in our climate, soon acquires a dark tone, injurious to the effect of a work of art; but we are inclined to believe that there may be a mixture of metals that would acquire an agreeable permanent colour. Among the finest monuments of modern times, that of Frederick the Great in Berlin, and of the Archduke Charles in Vienna, have hitherto retained a rich, lustrous colour; or, as in the case of the Greek horses in Venice, the statue of M. Aurelius in Rome, and other classic examples, gilding, in particular parts, and under certain conditions, might be resorted to.

Leaving for the moment these particular considerations, we proceed to point out the site which appears to us to be desirable for the Monument itself, and the general mode of treatment we would recommend.

We think, then, that the proper site is to be found by drawing a line from south to north, through the centre of the Horticultural Gardens, crossing the Kensington-road; and on the north side of which the ground rises sufficiently to Rotten-row to give the elevation required. At that point an extent of nearly 1,200 feet may be obtained for entrances to the Park, for terraces, fountains, flights of steps or inclines; and a depth (340 feet) sufficient for all purposes. In the centre of this area we would propose to place the Memorial itself. If in bronze, this may be a group of statues, without a building; or, if in marble, with a building to protect them.

We attach a sketch plan to this report, showing generally how this idea may be worked out, by which it will be seen that the area gained has the dimensions before stated of 1,200 feet from east to west, by 340 feet from north to south, in the centre. To obtain this we propose to straighten the main road, and to make another entrance and gates to the Park at the east end of the area, opposite the Exhibition-road, corresponding with that recently made, opposite the end of Prince Albert's-road. The drive in the Park and Rotten-row would both remain undisturbed.

The advantages gained by such a site are these:—It is at no great distance from the area occupied by the Exhibition Building of 1851, and is in immediate juxtaposition with the Horticultural Gardens—the result of His Royal Highness's own conception—thus forming a point of connection between the two.

Having thus given our views of the site and character of the Prince Consort Memorial, we approach with much more diffidence the consideration of the question of some building to be erected, with a view to general usefulness, in order to carry into effect to a certain extent the frequently expressed wishes of the Prince, and particularly to realize his views as stated in his address at the opening of the Horticultural Gardens.

It appears to us that, by the generosity of the nation, apart from the learned societies, science and art are provided for in the British Museum, the Museum in Jermyn-street, and the Schools at South Kensington. What seems to be wanted is some spacious hall and its necessary adjuncts, as a place for general art meetings; or for such assemblies as are about to take place in London in connection with social science and its kindred pursuits. We

have nothing in London for such an object like the great halls of Liverpool, Leeds, and Manchester.

If these views are well founded, and would be received with public or national favour, we see no reason why the vacant ground at the back of the Horticultural Gardens, south of the Kensington-road, as suggested by the Queen's Committee, should not be a fitting site for such a building.

Architecturally (and apart from general questions of expediency, upon which there doubtless exists a great variety of opinions) nothing could be happier, in our opinion, than to occupy the north side of the road with the Prince Consort Memorial, and the other side with a grand central hall, having approaches to the hall itself, and as at the present moment to the Horticultural-gardens; thus effectually screening from view the back of the Conservatory and the unsightly objects at present existing.

The sketch plan before referred to will show how all this could be arranged; but we only propose a general scheme, because it appears to us to be our duty rather to submit suggestions and general advice, than to presume to present anything like a detailed proposition.

If our recommendation on the subject of the actual site for the Memorial should meet with the approbation of her Majesty and the Committee, the individual efforts of the architect and the sculptor might be invited for its realisation, without attempting, at the present, to determine the final occupation of the vacant land on the south side of the road.

We have the honour to be,
Dear Sir Charles,
Your obedient servants,

WILLIAM TITE, T. L. DONALDSON.
S. SMIRKE, R. A., P. C. HARDWICK.
G. G. SCOTT, R.A., D. WYATT.
J. PENNETHORNE,

To Sir Charles Lock Eastlake, President of the
Royal Academy.

Osborne, July 18th, 1862.

MY DEAR SIR CHARLES,—The Queen desires me to acknowledge, through you, the receipt of the further Report of the Committee her Majesty had asked to advise on the subject of the proposed national monument to the Prince Consort.

Knowing the importance attached by the Prince to the establishment of some central Institution for the promotion of scientific and artistic education, the Queen is much pleased by your recommendation that the personal monument to his Royal Highness should be in immediate connection with buildings appropriated to that object.

Your Report, therefore, suggesting the erection of a central hall as the commencement of such buildings, and in connection with the personal monument to be placed directly opposite to it in Hyde-park, meets with her Majesty's entire and cordial approval; and should public support afford the means of giving effect to your recommendation, it will be far from being a matter of regret to her Majesty that the difficulties in the way of the original suggestion of an obelisk, as the principal feature of the proposed monument, were such as to lead you to counsel the abandonment of that idea.

Few things, indeed, could now make the Queen more happy than to be allowed to witness the realisation of some of her beloved husband's noble plans for the benefit of mankind. She knows how constantly he regretted that much of the good which the many Institutions founded for the advancement of science and art, in some one or other of their branches, were calculated to effect, was lost by their isolation and want of connection with each other.

But though strongly convinced of the advantage that would follow their being brought together, he was also strongly impressed with the importance of not interfering in any way with their free and voluntary action; believing that their union, to be productive of good, must be an

unforced union, brought about by a generally felt opinion of its necessity, and meeting with public support.

In fact, it was to public, as distinguished from Government or Parliamentary support, that he always looked for the means of giving effect to his plans.

He was, therefore, content to wait with patience till the conviction should have forced itself on the public mind, as it had long done on his own, of the expediency of giving to those bodies some general organisation or point of union, which should enable them mutually to assist each other in promoting their several objects; while it should leave untouched their power of independent action, and extend rather than limit their sphere of individual usefulness.

It would have gratified the Prince much, therefore, as it is now a source of some consolation to the Queen, to find that one of his great ideas for the good of the world (for his views were by no means limited to this country), forms the basis of the recommendation contained in your Report; and Her Majesty can have no dearer wish on this subject than that the estate purchased, as you say, by his "judicious counsel" and wise "foresight and decision," should be devoted to such a purpose; that the establishments actually upon it, as well as those that may be expected to come there, should be considered as a whole—to form one Institution—one great and comprehensive Institution—having for its object (to use the Prince's own words, as quoted by the committee), "to increase the means of Industrial Education, and extend the influence of Science and Art upon productive Industry."

For such an Institution some appropriate title, connected with the Prince's name, will doubtless hereafter be found; while, from its object, and still more from the benefits which the Queen hopes would follow the development of this idea, it would be fitly connected with the Personal Monument, and would itself form the most lasting and worthy Memorial of the Prince's untiring and unselfish exertions for the general good.

I remain,

Dear Sir Charles,

Yours very sincerely,

C. GREY.

Sir C. Eastlake, &c., &c., &c.

Palace of Westminster, July, 1862.

SIR,—On the part of the Prince Consort Memorial Committee, I beg to call your attention to the accompanying copies of a report and sketch-plan furnished by the architects who had been requested by the Committee to consider the question of a fitting site for the Memorial to the Prince.

The scheme proposed in that report having been recommended, as a general arrangement, in the second report of the Committee to the Queen, (a copy of which is enclosed,) and her Majesty having been graciously pleased to approve of the same, I am requested to invite you to consider the scheme in detail, and to inquire whether you would be willing to furnish designs comprehending the following objects:—

1. A design for the Memorial itself, adapted to the site indicated on the plan, and proportioned in its height and magnitude to the position it will occupy, and to the buildings which may hereafter be erected on the south side of the public road.

These general requisites being compatible with a variety of designs, the Committee are unwilling to prescribe any particular kind of monument. They conceive, however, that as her Majesty's pleasure has to a certain extent been made known, and will at all times be consulted, it will be advisable for those who propose to submit designs to refer to the various letters from General Grey, dated respectively the 19th February, the 19th April,* and the 18th July, in which her Majesty's views are expressed.

Another important consideration will be the amount of the fund which may be available for the cost of the Memorial itself; for that of the proposed straightening of the public road; for the arrangement of the area in Hyde-park, with its decorations, and, if possible, for the hall on the south side of the road.

The design for the architectural portion of the Memorial should be regarded chiefly as a means of ensuring the most effective arrangement of the sculpture which is to complete it. The position, dimensions, and material of the statues may be indicated, without anticipating or interfering with the conceptions of the sculptors. It is conceived that this system of combined invention, so common among the architects and sculptors of antiquity when employed on temples and mausoleums, is no less desirable and practicable when the object is to provide an architectural base for groups of sculpture, surmounted by the statue which is required to be conspicuous.

2. As the site for the memorial indicated in the plan leaves the form and character of the monument undetermined, so the arrangement of the ornamented area in Hyde-park is merely intended to show the extent proposed to be so treated. Each architect is, therefore, free either to adopt the arrangement indicated, or to vary it as he pleases; care being taken to maintain the connection expressed in the plan between the memorial and the proposed buildings on the south side of the public road.

A design will be required for the foundations marked on the plan. The precise site, as well as the dimensions, are not to be considered as strictly defined; more especially as it may be thought preferable that the line from east to west in which the foundations are placed should be parallel with the southern boundary of the area. It will be necessary to ascertain what facilities exist, or can be provided, for supplying the fountains with water; the requisite details for carrying this part of the scheme into execution being practically investigated.

3. It will be desirable that the general plan of the Hall (about 150 feet by 80 feet) should be defined, and that a plan of the buildings which may be ultimately erected near it, should be indicated; the lateral approaches to the garden of the Horticultural Society being preserved. It is suggested that the hall might be placed nearer to the public road, the buildings next it on the architect's plan being also brought forward, and, should it be thought desirable, even nearer to the road than the hall itself. A reference to the actual state of the ground on this side of the road, will show that, whatever prospective arrangements may be devised, it is only possible at present to deal with the unoccupied central portion of that ground.

A sketch-elevation will be required for the hall, but not for the contiguous buildings, the indication of which is, however, left to the discretion of the architects. A copy of a correspondence between the Memorial Committee and the Commissioners for the Exhibition of 1851, respecting the site and dimensions of the proposed hall, is enclosed.

4. The designs generally will consist, according to the subject treated, of plan alone, or of plan and elevation, sections being added when necessary. Plans showing the general arrangement, should be drawn to a scale of 2½ inches to 100 feet. Detailed designs for the Memorial should be drawn to a scale of one inch to five feet; the scale of other drawings being left to the choice of the architects.

5. Separate estimates will be required for the Memorial (with an approximate estimate for the sculpture); for the fountains; for the general arrangement of the ground; for the straightening of the public road, and for the railings and entrance gates. A general estimate will also be required for the hall, including the levelling of the ground, and the railings and entrance gates on the south side of the road.

* See present vol. of *Journal*, pp. 218 and 372.

GENERAL CONDITIONS.

The following architects are invited to submit designs for the Memorial, &c., as above explained :—

Wm. Tite, Esq., M.P.	Philip C. Hardwick, Esq.,
Sydney Smirke, Esq., R.A.	F.S.A.
Geo. Gilbert Scott, Esq., R.A.	M. Digby Wyatt, Esq.,
James Pennethorne, Esq.	F.S.A.
Thos. L. Donaldson, Esq.	Charles Barry, Esq.
	Edwd. M. Barry, Esq.

The designs are to be confined to drawings; no models will be required.

Should a design be approved by her Majesty, the architect offering it will be commissioned to execute the work in conjunction with the sculptor or sculptors who may be selected.

The sum of one hundred guineas will be placed at the disposal of each of the architects whose design may not be chosen.

The designs will be required to be ready by the 1st December next. Due notice will be given where they should be delivered.

It is not proposed that the designs shall be publicly exhibited by the Committee.

After mature consideration of the objections which have been urged against unlimited competition, the Committee have decided not to invite other designs, except in the event of no one of those by the architects now selected being considered satisfactory.

I am, Sir, your obedient servant,
C. L. EASTLAKE.

COPY OF CORRESPONDENCE BETWEEN THE PRINCE CONSORT MEMORIAL COMMITTEE AND THE COMMISSIONERS FOR THE EXHIBITION OF 1851, RESPECTING THE SITE AND DIMENSIONS OF A PROPOSED HALL.

7, Fitzroy-square, 10th June, 1862.

Sir,—Referring to what passed at the meeting of the Memorial Committee, on the 7th, when you were so good as to attend and furnish some important information, I now forward to you the plan and report sent by the architects who had been invited to express their views on the subject of the Memorial.

The members of the Memorial Committee are desirous that you should bring this plan (confidentially) under the notice of the Finance Committee of the 1851 Commission.

The main features of the scheme, it will be seen, are a Monument in Hyde Park, between Rotten-row and the public road; and a Central Hall, south of the public road, in a direct line between the Monument and the centre of the Conservatory.

As the position of this Central Hall may be very materially affected by the future intended application of the adjoining ground, you are requested to ask the Finance Committee to point out the spot, on the line above indicated between the Conservatory and the road, which would best suit their future objects.

I have, &c.,
C. L. EASTLAKE.

Edgar Bowring, Esq., C.B.

Whitehall, June 10.

Sir,—I am directed by her Majesty's Commissioners for the Exhibition of 1851 to acknowledge the receipt of your letter of the 10th inst., submitting, on behalf of the committee appointed by the Queen to advise her Majesty on the subject of the memorial to the Prince Consort, the plan and report sent in by the architects invited to express their views on the subject of the memorial, and requesting the Commissioners to point out the spot on the line between the proposed monument in Hyde-park and the centre of the Conservatory of the Horticultural Gardens on which might be erected a Central Hall as part of the scheme of the Memorial.

In reply I am to express to the Queen's Committee the satisfaction which her Majesty's Commissioners must necessarily feel at any plan which may serve to connect the National Memorial to the late Paine Consort, their own illustrious and lamented President, with the Kensington-gore estate, and with the proposed site of the Hall referred to in your letter.

The Commissioners direct me to state their readiness to reserve for a reasonable time a suitable site for that Hall of the space required (about 150ft. by 80ft.), in the centre of the northern frontage of their estate adjoining the Kensington-road, and lying between Prince Albert's-road and Exhibition-road, and immediately opposite to the centre of the intended Memorial, leaving the decision as to the exact proximity of the Hall to the public road for further consideration and future consultation with the Queen's Committee.

I have, &c.,
EDGAR A. BOWRING.

Sir C. L. Eastlake.

ARTISTIC COPYRIGHT.

The following is a copy of the Act that has just been passed :—

An Act for Amending the Law relating to Copyright in Works of the Fine Arts, and for Repressing the Commission of Fraud in the Production and Sale of such Works. 25th and 26th Victoria, cap. 68: 29th July, 1862.

Whereas by law, as now established, the authors of paintings, drawings, and photographs have no copyright in such their works, and it is expedient that the law should in that respect be amended: be it therefore enacted by the Queen's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows :—

1. The author, being a British subject, or resident within the dominions of the Crown, of every original painting, drawing, and photograph, which shall be or shall have been made either in the British dominions or elsewhere, and which shall not have been sold or disposed of before the commencement of this Act, and his assigns, shall have the sole and exclusive right of copying, engraving, reproducing, and multiplying such painting or drawing, and the design thereof, or such photograph, and the negative thereof, by any means and of any size, for the term of the natural life of such author, and seven years after his death, provided that when any painting or drawing, or the negative of any photograph, shall for the first time after the passing of this Act be sold or disposed of, or shall be made or executed for or on behalf of any other person for a good or a valuable consideration, the person so selling or disposing of or making or executing the same shall not retain the copyright thereof, unless it be expressly reserved to him by agreement in writing, signed at or before the time of such sale or disposition, by the vendee or assignee of such painting or drawing, or of such negative of a photograph, or to the person for or on whose behalf the same shall have been made or executed, but the copyright shall belong to the vendee or assignee of such painting or drawing, or of such negative of a photograph, or to the person for or on whose behalf the same shall have been made or executed; nor shall the vendee or assignee thereof be entitled to any such copyright, unless, at or before the time of such sale or disposition, an agreement in writing, signed by the person so selling or disposing of the same, or by his agent duly authorised, shall have been made to that effect.

2. Nothing herein contained shall prejudice the right of any person to copy or use any work in which there shall be no copyright, or to represent any scene or object, notwithstanding that there may be copyright in some representation of such scene or object.

3. All copyright under this Act shall be deemed personal or moveable estate, and shall be assignable at law,

and every assignment thereof, and every licence to use or copy by any means or process the design or work which shall be the subject of such copyright, shall be made by some note or memorandum in writing, to be signed by the proprietor of the copyright, or by his agent appointed for that purpose in writing.

4. There shall be kept at the Hall of the Stationers' Company, by the officer appointed by the said company, for the purposes of the Act passed in the sixth year of her present Majesty, intituled "An Act to Amend the Law of Copyright," a book or books, entitled "The Register of Proprietors of Copyright in Paintings, Drawings, and Photographs," wherein shall be entered a memorandum of every copyright to which any person shall be entitled under this Act, and also of every subsequent assignment of any such copyright; and such memorandum shall contain a statement of the date of such agreement or assignment, and of the names of the parties thereto, and of the name and place of abode of the person in whom such copyright shall be vested by virtue thereof, and of the name and place of abode of the author of the work in which there shall be such copyright, together with a short description of the nature and subject of such work, and in addition thereto, if the person registering shall so desire, a sketch, outline, or photograph of the said work, and no proprietor of any such copyright shall be entitled to the benefit of this Act until such registration, and no action shall be sustainable nor any penalty be recoverable in respect of anything done before registration.

5. The several enactments in the said Act of the sixth year of her present Majesty contained, with relation to keeping the register book thereby required, and the inspection thereof, the searches therein, and the delivery of certified and stamped copies thereof, the reception of such copies in evidence, the making of false entries in the said book, and the production in evidence of papers falsely purporting to be copies of entries in the said book, the application to the courts and judges by persons aggrieved by entries in the said book, and the expunging and varying such entries, shall apply to the book or books to be kept by virtue of this Act, and to the entries and assignments of copyright and proprietorship therein under this Act, in such and the same manner as if such enactments were here expressly enacted in relation thereto, save and except that the forms of entry prescribed by the said Act of the sixth year of her present Majesty may be varied to meet the circumstances of the case, and that the sum to be demanded by the officer of the said company of stationers for making any entry required by this Act shall be one shilling only.

6. If the author of any painting, drawing, or photograph in which there shall be subsisting copyright, after having sold or disposed of such copyright, or if any other person, not being the proprietor for the time being of copyright in any painting, drawing, or photograph, shall, without the consent of such proprietor, repeat, copy, colourably imitate, or otherwise multiply for sale, hire, exhibition, or distribution, or cause or procure to be repeated, copied, colourably imitated, or otherwise multiplied for sale, hire, exhibition, or distribution, any such work or the design thereof, or, knowing that any such repetition, copy, or other imitation has been unlawfully made, shall import into any part of the united kingdom, or sell, publish, let to hire, exhibit, or distribute, or offer for sale, hire, exhibition, or distribution, or cause or procure to be imported, sold, published, let to hire, distributed, or offered for sale, hire, exhibition, or distribution, any repetition, copy, or imitation of the said work, or of the design thereof, made without such consent as aforesaid, such person for every such offence shall forfeit to the proprietor of the copyright for the time being a sum not exceeding ten pounds; and all such repetitions, copies, and imitations made without such consent as aforesaid, and all negatives of photographs made for the purpose of obtaining such copies, shall be forfeited to the proprietor of the copyright.

7. No person shall do or cause to be done any or either of the following acts; that is to say,

First, no person shall fraudulently sign or otherwise affix, or fraudulently cause to be signed or otherwise affixed, to or upon any painting, drawing, or photograph, or the negative thereof, any name, initials, or monogram:

Secondly, no person shall fraudulently sell, publish, exhibit, or dispose of, or offer for sale, exhibition, or distribution, any painting, drawing, or photograph, or negative of a photograph, having thereon the name, initials, or monogram of a person who did not execute or make such work.

Thirdly, no person shall fraudulently utter, dispose of, or put off, or cause to be uttered or disposed of, any copy or colourable imitation of any painting, drawing, or photograph, or negative of a photograph, whether there shall be subsisting copyright therein or not, as having been made or executed by the author or maker of the original work from which such copy or imitation shall have been taken.

Fourthly, where the author or maker of any painting, drawing, or photograph, or negative of a photograph, made either before or after the passing of this Act, shall have sold or otherwise parted with the possession of such work, if any alteration shall afterwards be made therein by any other person, by addition or otherwise, no person shall be at liberty, during the life of the author or maker of such work, without his consent, to make or knowingly to sell or publish, or offer for sale, such work or any copies of such work so altered as aforesaid, or of any part thereof, as or for the unaltered work of such author or maker.

Every offender under this section shall, upon conviction, forfeit to the person aggrieved a sum not exceeding ten pounds, or not exceeding double the full price, if any, at which all such copies, engravings, imitations, or altered works shall have been sold or offered for sale, and all such copies, engravings, imitations, or altered works shall be forfeited to the person, or the assigns or legal representatives of the person whose name, initials, or monogram shall be so fraudulently signed or affixed thereto, or to whom such spurious or altered work shall be so fraudulently or falsely ascribed as aforesaid: provided always, that the penalties imposed by this section shall not be incurred unless the person whose name, initials, or monogram shall be so fraudulently signed or affixed, or to whom such spurious or altered work shall be so fraudulently or falsely ascribed as aforesaid, shall have been living at or within twenty years next before the time when the offence may have been committed.

8. All pecuniary penalties which shall be incurred, and all such unlawful copies, imitations, and all other effects and things as shall have been forfeited by offenders, pursuant to this Act, and pursuant to any act for the protection of copyright engravings, may be recovered by the person herein-before and in any such act as aforesaid empowered to recover the same respectively, and hereinafter called the complainant or the complainer, as follows:—

In England and Ireland, either by action against the party offending, or by summary proceedings before any two justices having jurisdiction where the party offending resides.

In Scotland by action before the Court of Session in ordinary form, or by summary action before the sheriff of the county where the offence may be committed or the offender resides, who, upon proof of the offence or offences, either by confession of the party offending, or by the oath or affirmation of one or more credible witnesses, shall convict the offender, and find him liable to the penalty or penalties aforesaid, as also in expenses, and it shall be lawful for the sheriff, in pronouncing such judgment for the penalty or penalties and costs, to insert in such judgment a warrant, in the event of such penalty or penalties and costs not being paid, to levy and recover the amount of the same by poinding: provided always that it shall be lawful to the sheriff, in the event of his dismissing the

action and assailing the defender, to find the complainant liable in expenses, and any judgment so to be pronounced by the sheriff in such summary application shall be final and conclusive, and not subject to review by advocacy, suspension, reduction, or otherwise.

9. In any action in any of her Majesty's superior courts of Record at Westminster and in Dublin, for the infringement of any such copyright as aforesaid, it shall be lawful for the court in which such action is pending, if the court be then sitting, or if the court be not sitting, then for a judge of such court, on the application of the plaintiff or the defendant respectively, to make such order for an injunction, inspection, or account, and to give such direction respecting such action, injunction, inspection, and account, and the proceedings therein respectively, as to such court or judge may seem fit.

10. All repetitions, copies, or imitations of paintings, drawings, or photographs, wherein or in the design whereof there shall be subsisting copyright under this Act, and all repetitions, copies, and imitations of the design of any such painting or drawing, or of the negative of any such photograph, which, contrary to the provisions of this Act, shall have been made in any foreign state, or in any part of the British dominions, are hereby absolutely prohibited to be imported into any part of the United Kingdom, except by or with the consent of the proprietor of the copyright thereof, or his agent authorised in writing; and if the proprietor of any such copyright, or his agent, shall declare that any goods imported are repetitions, copies, or imitations of any such painting, drawing, or photograph, or of the negative of any such photograph, and so prohibited as aforesaid, then such goods may be detained by the officers of her Majesty's Customs.

11. If the author of any painting, drawing, or photograph, in which there shall be subsisting copyright, after having sold or otherwise disposed of such copyright, or if any other person, not being the proprietor for the time being of such copyright, shall, without the consent of such proprietor, repeat, copy, colourably imitate, or otherwise multiply, or cause or procure to be repeated, copied, colourably imitated, or otherwise multiplied, for sale, hire, exhibition, or distribution, any such work or the design thereof, or the negative of any such photograph, or shall import or cause to be imported into any part of the United Kingdom, or sell, publish, let to hire, exhibit, or distribute, or offer for sale, hire, exhibition, or distribution, or cause or procure to be sold, published, let to hire, exhibited, or distributed, or offered for sale, hire, exhibition, or distribution, any repetition, copy, or imitation of such work, or the design thereof, or the negative of any such photograph, made without such consent as aforesaid, then every such proprietor, in addition to the remedies hereby given for the recovery of any such penalties, and forfeiture of any such things as aforesaid, may recover damages by and in a special action on the case, to be brought against the person so offending, and may in such action recover and enforce the delivery to him of all unlawful repetitions, copies, and imitations, and negatives of photographs, or may recover damages for the retention or conversion thereof: provided that nothing herein contained, nor any proceeding, conviction, or judgment, for any act hereby forbidden, shall affect any remedy which any person aggrieved by such act may be entitled to either at law or in equity.

12. This Act shall be considered as including the provisions of the Act passed in the session of Parliament held in the seventh and eighth years of her present Majesty, intitled, "An Act to amend the Law relating to International Copyright," in the same manner as if such provisions were part of this Act.

CITY OF LONDON COLLEGE.

The following is the result of the annual examination, July, 1862.

Annual scholarship of £10, with free admission to the

college for one year. This scholarship to be given to the student who obtains the highest aggregate number of marks in any of the three subjects of examination. Awarded to Mr. J. H. Levy.

Commercial prize, £5, to be awarded to the student who shall rank highest among those who obtain the commercial certificates, *i.e.*, for arithmetic, book-keeping, French, and either German, Italian, or Spanish. Awarded to Mr. H. L. Hughes.

"Lowth" prize, £5, to the student who has attended the classes most regularly in three of the subjects of examination, provided he obtain first-class certificates, and his conduct and character be unimpeachable. Awarded to Mr. Wm. Vaughan.

The Principal's (special) Divinity prize, £3 3s., awarded to Mr. John Macrae.

English Essay, prize £2.—Subject, "The International Exhibition of 1862." Mr. John Macrae.

Prizes were also awarded in the following subjects:—

Arithmetic and book-keeping, two prizes, W. G. Masham. Algebra and Euclid, William Vaughan. Chemistry, Wm. Meadows. Drawing, J. Appleton. German, H. Hempleman, 1st, and H. L. Hughes, 2nd.

The following obtained first-class certificates:—Arithmetic:—W. G. Masham, J. H. Levy, T. J. Lloyd, A. B. Clementson. Algebra:—Wm. Vaughan, Henry Hoskins, Euclid:—Wm. Vaughan, J. H. Levy. Book-keeping:—H. J. Garside, W. G. Masham, R. C. Bennett, A. Day. Chemistry:—Wm. Meadows. Drawing:—J. Appleton, G. Smith. German:—H. Hempleman, H. L. Hughes, F. Bailey. French:—J. S. Harding, H. L. Hughes, G. Dickson. And upwards of 50 other certificates were awarded.

EXAMINATION PAPERS, 1862.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(Continued from page 584.)

ASTRONOMY.

THREE HOURS ALLOWED.

1. Describe the different species of lenses.
2. What are the radius, axis, and focus of a lens?
3. Trace the path of the rays passing through a convex glass; first, when exposed to the sun; secondly, when exposed to a luminous point; and thirdly, when exposed to a luminous object, as a line.
4. How many lenses are there in an astronomical telescope; is the image of an object reversed? Prove this by tracing the rays of light from an object to which the object glass is directed to the eye of the observer.
5. How many lenses are there in a telescope which does not invert?
6. What is refraction? In what plane does it exert an influence? Are right ascensions, or declinations, or both, affected by it?
7. Where is that star situated which suffers no refraction?
8. What is the maximum amount of refraction? and where is a star situated when under its greatest influence?
9. Is the azimuth of a heavenly body affected by refraction?
10. How is refraction connected with twilight?
11. What is parallax, and in what plane does it exert an influence?
12. Does parallax affect the right ascension of a heavenly body?
13. Describe the mural circle.
14. For what purpose is the mural circle applied? Describe the mode of observing by it.
15. What is terrestrial longitude?

16. Describe some method adopted in the determination of terrestrial longitude.

17. Explain how longitudes are determined by transits of the moon and moon culminating stars.

18. At any particular place in the northern hemisphere, what are the North Polar distances of those stars which never set?

19. Let the observed transits of Saturn's first and second limbs be 9 h. 54 m. 42.07 s., and 9 h. 54 m. 43.31 s.; and suppose the correction for collimation to be + 0.04 s.; that for level, + 0.47 s.; and for azimuth - 0.03 s.; the clock slow at the preceding 0 h. sidereal 7.17 s., with a losing daily rate of 0.3 s.; what is the difference between the right ascension of the planet and its place as calculated from the almanack, viz., 9 h. 54 m. 50.96 s.?

20. Given the concluded circle reading for Jupiter, 141° 21' 46.24", the reading of the circle when the telescope is directed to the zenith, 83° 31' 21.70"; the correction for refraction, 1' 33.07"; for parallax, 1.26"; for diameter, 33.96"; and the latitude of the place, 51° 28' 38.20"; what is the error of the tables which give 96° 23' 32.70", as the place of the planet at the time of observation?

CHEMISTRY.

THREE HOURS ALLOWED.

(No candidate is to answer more than three questions in each division.)

FIRST DIVISION.

1. How is nitrogen gas prepared from atmospheric air? What weight of it is contained in a pound of air?

2. Describe by formulæ the action of sulphuric acid on a mixture of chloride of sodium and binocide of manganese.

3. Name and describe the most important natural products containing sulphur.

4. What weight of air is needed for the complete combustion of a hundredweight of charcoal?

5. How much heavier than hydrogen are the following gases, viz.: oxygen, nitrogen, carbonic acid, carbonic oxide, ammonia?

6. How is fluorine best detected in minerals?

SECOND DIVISION.

1. What elements are most analogous to antimony in their chemical properties? How is it separated from them?

2. How is metallic gold best separated out in a state of purity from its common alloys?

3. Describe the preparation, properties, and composition of the chief salts of copper.

4. How is chromium separated from iron?

5. What is the composition of hydraulic mortar?

6. Give the formula for the ordinary crystals of Epsom salts. How is the substance usually prepared?

THIRD DIVISION.

1. Describe the manufacture of acetic acid. How is the acid obtained in the anhydrous state?

2. Describe the manufacture of sugar from the cane. What is the action of acids and what the action of alkalis on sugar? How is it purified?

3. Describe accurately a process for determining quantitatively the nitrogen in an organic body.

4. How is tartaric acid distinguished from citric acid?

6. What is meant by the term mordant? Describe and explain some case of the action of a mordant.

6. What are the chief constituents of coal tar? How are they separated?

ANIMAL PHYSIOLOGY.

THREE HOURS ALLOWED.

1. Describe the microscopic structure and vital properties of the nervous tissues.

2. What are the conditions necessary to the continuous healthy performance of the functions of the brain?

3. Classify the various kinds of food on chemical principles. What is the destination of the different kinds in the living animal economy? State the grounds of the opinion that a variety of food is necessary to health.

4. Give an account of the bile and its uses. (The liver need not be described.)

5. Describe the heart and its mode of action in determining the circulation of the blood. What other agencies assist the circulation? Enumerate any conditions which interfere with the due performance of this function, generally or locally, and state the inconveniences or injury which may thus be produced.

6. Describe the coagulation of the blood, and state what is known of its cause, its attendant phenomena, and the circumstances which facilitate or retard it. Give an example or two of the use of this property of the blood.

7. How would you know, in the case of a wound, whether blood was escaping from an artery or a vein; and how would you stop the bleeding in either case?

BOTANY.

THREE HOURS ALLOWED.

The Candidate is expected to answer correctly six questions in Section I., and eight questions in Section II.; Nos. 11 and 12 of the latter each standing for one answer.

SECTION I. VEGETABLE PHYSIOLOGY.

1. Describe a spiral vessel, and state in what parts that kind of tissue is never or very rarely found.

2. Vegetable textile materials consist of certain forms of elementary tissue. Which form is the strongest? and why?

3. Explain the nature of a carpel theoretically.

4. Show in what manner a five-celled ovary is to be reconciled with the carpellary theory.

5. When a calyx is said to be monosepalous (one sepaled), what is really meant by the term?

6. What is pollen, and for what purpose is it formed?

7. What is the structure of epidermis, and what are its functions?

8. Describe any stomate.

SECTION II.—PRACTICAL BOTANY.

1. What is meant by the term verticillate?

2. State the difference between a spike and a raceme.

3. What is the difference between a bulb and a tuber? To which do you refer a potato?

4. Distinguish an umbel from a corymb and a capitulum.

5. What is ruminated albumen? Give an example.

6. Distinguish Caryophyllaceæ from Geraniaceæ.

7. Distinguish Polygonaceæ from Euphorbiaceæ.

8. Distinguish Solanaceæ from Primulaceæ.

9. How does the genus *Triticum* differ from *Hordeum*?

10. Name the plants marked A, B, C, D, or give their natural orders, with reasons for your opinion.

11. { Describe the two plants now placed before you

12. { strictly according to the form given in "Descriptive Botany," chap. vii.*

AGRICULTURE.

THREE HOURS ALLOWED.

I.—TILLAGE, &c.

1. State the various causes to which the fertilising influence of land drainage may be owing.

2. Enumerate the operations of a fallow—saying when they should be respectively performed.

* Any two plants, in flower, may be taken by the local Examiner, he reporting their names to the Society of Arts when he returns the candidates' papers.

3. How does the comminution of a soil (its *tilth*) tend to its fertility.

4. In what ways does the application of lime to a soil promote its fertility?

5. Describe the operation of liming in two or three of the usual modes of the application—stating the quantity of lime per acre you would apply, and the place in the rotation where it should come.

II.—CROPS.

6. What explanations have been given of the need of a rotation of crops, and to which of them do you attach the greatest importance?

7. State some of the usual rotations adopted, and say to what soils they are respectively adapted.

8. Name the seed-time of the following crops, the ordinary quantity of seed used per acre, the usual produce per acre, and the soils preferred by them.

Write out your answers in a tabular form, as follows:—

Name of Crops.	Seed Time.	Seed per acre. Bushels or Pounds.	Produce per acre. Bushels or Tons.	Soils.
Wheat				
Barley				
Oats				
Beans				
Peas				
Potatoes				
Wurzel				
Turnips				
Swedes				
Rape				
Vetches				
Lucerne				
Sainfoin				
Clovers				

9. Describe the cultivation of (a) the potato; (b) Italian rye grass; (c) mangold wurzel; (d) Lucerne.

III.—LIVE STOCK.

10. What extent (acres) and kinds of cropping must you provide in ordinary seasons on fair arable land, under good management, for the annual keep of 400 large Down ewes (and their produce), whose lambs are kept till 13 or 14 months old, and then sold fat, reaching 20 to 24 lbs. per quarter?

11. What extent and kinds of cropping under similar circumstances must you provide for the food of 100 fattening beasts (receiving cake in addition), bought in early in October, and sold out fat (to average 8 cwt.) week by week between the middle of March and the middle of May?

12. Name and describe our best dairy breeds of cattle, stating their average produce per annum in milk, butter, or cheese, according to the purpose for which they are kept.

13. Name and describe four or five of our best breeds of sheep, stating the average weight and quality of their wool, and the average age and weight of their carcase.

(To be continued.)

Home Correspondence.

RECREATION AT MECHANICS' INSTITUTES.

SIR,—The recreations to which it is desirable that the managers of Mechanics' Institutes should direct their attention, should be divided into two separate and distinct classes: those for open-air exercise, adapted to the summer months, and those for in-doors, adapted to the winter months. Both will of course comprise many pursuits which are merely amusing, and but in a very slight degree of an intellectual character, but both may be made conducive to the higher objects for which the Institute has been established, and so far promote the moral, mental, and social welfare of the community.

It is unfortunately only the few who can appreciate the importance of a right direction being given to the amusements of the population; who feel convinced that the people, whether right or wrong, will have some kind of what they call enjoyment, and that the good or evil of such indulgence will depend in a great measure, mainly, if not wholly, upon the direction which is given to it. If no one provides recreation of a healthful and innocent character, then resort is had to that which is both injurious and immoral. The evil is done, and in vain will moralists inveigh against crime or folly, or descant in glowing terms upon the advantages of self-improvement.

For summer amusements, much will depend upon the conveniences afforded by the locality. Where the necessary ground can be obtained, the game of cricket offers many advantages. It requires a number of players, and these can be obtained with the most facility by the class of an Institute which, having a regular evening of meeting, can almost always insure a good field to make the game interesting. It requires some apparatus, in stumps, bats, and balls, and these can be provided most efficiently by the joint-stock fund which the members should raise by a small subscription. Propriety of conduct may be secured by the bye-laws of the class, to be enforced by small fines, and practice will materially contribute not only to the skill, but to the bodily health of the members. An additional stimulus will also be given by occasional matches with the cricket clubs of other Institutes, and this has been done with good results by some of the Institutes in Leeds and the neighbourhood.

Where other games may be preferred to cricket, the members can resort to bowls, quoits, foot-races, and such amusements as may be popular in the country side, the great advantages being the connection with the Institute, the regularity to be enforced by rules, and the acquaintance of the members with each other, which is far superior to the casual meetings for purposes of recreation and association with strangers.

Where the tastes of the members are of a more intellectual or scientific character, excursions may be made, at stated times, for the practical study of botany, geology, entomology, landscape sketching, architecture, antiquities, &c. Whatever be the recreation, it may be in a great measure adapted to the tastes and inclinations of those for whom it is provided; and instead of closing all the classes during the summer months, which is too frequently the case, a great number of the members would be induced to continue their subscriptions and their connection with the Institute all the year round.

Besides the above, there might also be occasional excursions, by cheap railway trips, to objects of interest at a greater distance; and if these be under judicious management, not only would the Institute profit in a pecuniary sense, but there would be more interest felt and more individual advantage gained by those who take part in them. Some short time since the Manchester Museum was opened on a Saturday afternoon to working people at a cheaper rate than ordinary. Mr. David Morris, one of the curators, undertook to give brief descriptions and explanations of the contents of the several cases, and so successful was the experiment, that the attendance, which at first was very scanty, increased in a few weeks to several hundreds. Wherever an intelligent explanation can be had of objects exhibited, whether natural or artificial, or antiquities, the working people as a class are not insensible to the instruction to be thus acquired, nor slow to appreciate it. Local museums more commonly fail from the want of an intelligent guide, than from disregard to the information they may afford; and if gentlemen possessing the ability would undertake to give short explanatory discourses, either in museums or similar objects of interest, to classes of working men from Institutes, many a delightful source of recreation might be gained.

In a future letter I will offer some remarks upon winter amusements.

I am, &c.

BARNETT BLAKE.

Proceedings of Institutions.

NOTTINGHAM MECHANICS' INSTITUTION.—The twenty-fourth annual report states that although there is a decrease of members, the committee feel convinced that such diminution is no ground for discouragement. Considering the state of trade and the scarcity of employment, the decrease is smaller than might reasonably have been anticipated, and is not so large as similar Institutions, of less resources and numbers, have sustained during the same period. The works in the Library have been carefully examined, and a new catalogue prepared. The total issues of books and periodicals have been 29,436. Earnestly desirous of rendering the library especially useful to working men, the committee have added various works in the arts and manufactures during the year. Most of these works are too costly to admit of their being purchased by individuals who have to labour for subsistence, and yet a knowledge of their contents is absolutely necessary to the attainment of excellence as workmen. The committee thankfully acknowledge various donations to the library. 198 volumes have been purchased, and twenty-nine presented, during the year. The present reading-room is found to be inadequate to the comfortable accommodation of the members, and some arrangement should be made for placing a larger room at their service. The lectures delivered during the past year are as follow:—"A Night with the Moon," Mr. W. R. Birt, F.R.A.S.; "A Night amongst the Stars," Mr. W. R. Birt, F.R.A.S.; "Hogarth and his Pictures," Rev. H. S. Brown; "Hudibras," Rev. H. S. Brown; "Wit and Humour," Mr. George Grossmith; "Adam Bede," Mr. George Grossmith; "The Recent Spectrum Discoveries," Dr. Roscoe; "The Origin, Character, and Doings of the Anglo-Saxons," Mr. George Dawson, M.A. The members are admitted without charge to the present course of lectures—an arrangement which, so far as the experiment has been tried, and the Committee are able to judge therefrom, has led to a more general attendance on these occasions. There are forty students in the French class, with an average attendance of about thirty. These figures shew an increase of twenty-six as compared with 1860. In consequence of this large increase the teacher, Mons. Durand, has found it necessary to divide the students into three divisions. In the discussion class there are thirty-two members, with an average attendance of twenty. The subjects which have occupied the attention of the members are:—"America, Past and Present"—"The French Treaty"—"The Rights of Women"—"On Character"—"Mental Culture"—"Ought the State to conduct the Education of the People?" During the session an experiment had been tried of having readings from standard authors on alternate evenings, but the plan not succeeding, it has been discontinued. The chess class is one of the most popular in the institution, and numbers more than fifty members. With a view of promoting the study of chess, a competition is now in progress for three prizes. The first, a very handsome set of chessmen, has been given, with his usual liberality to the class, by its respected president, S. Newham, Esq. A friendly contest is also going on between the class and the Stamford Club, and there is a laudable ambition on the part of the members to do credit to the Institution. It appears from the report of the Naturalists' Society that the admissions to the Museum during the year by payment have been 5,133. This number, of course, is exclusive of visits by members of the Mechanics' Institution, who have free admission. The receipts, including a balance in hand, have been £62 11s. 8d., and the expenditure less than that sum by £21 11s. 2d. The sum of 15s. 8d. is due to the Committee of the Institution, being one-half of the nett proceeds of the exhibition. An interesting series of lectures is announced by the Society, to be delivered by gentlemen of the town and neighbourhood, to which members are also admitted without charge.

The Committee have to report that a considerable sum has been expended in painting and decorating the large hall and entrances, and in altering the plan of lighting the room. They have no doubt that these improvements, although costly at first, will prove ultimately the most economical modes of cleaning and lighting the hall. At present the system of ventilation does not work so well as could be desired, but the Committee hope to attain the desired result in a short time. The number of members is 968, being a decrease of thirty. There are, however, nearly 100 members who, being in arrears of their subscriptions, are not included in the above list. 109 persons have joined the Institution during the year, and fifty-five have transferred their shares. The admissions are forty-six, and the transfers seven, fewer than in 1860. The diminution is eighteen honorary and twelve ordinary members. The classification of members stands thus:—Professional men and manufacturers, 86; shopkeepers and tradesmen, 85; clerks, shopmen, and warehousemen 287; journeymen lace and stocking makers, 14; journeymen joiners, masons, bricklayers and plumbers, 18; journeymen smiths, engineers, and workers in metal, 26; journeymen bakers, butchers, labourers, &c., 16; journeymen shoemakers, tailors, and printers, 34; artists designers, and schoolmasters, 71; youths under twenty-one years of age, 52; females, 63. Honorary members 132; Life members, 84. Total, 968. The balance sheet, from January the 1st to December the 31st, 1861, shows that the income for the year has been £649 14s., and the expenditure £594 13s. 4½d., leaving a balance in hand of £55 0s. 7½d.

To Correspondents.

The Paper by Captain Symonds, on Screw Steamers, of which the substance appeared in the *Journal* for the 25th July, was read before the Royal United Service Institution.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par Numb.	Delivered on 16th July, 1862.
380.	Navy (Ships on Foreign Stations)—Return.
403.	Cape of Good Hope (German Settlers)—Return.
397.	Income Tax—Return.
404.	Militia Officers—Return.
406.	Spirits (Liverpool)—Return.
407.	Public Income and Expenditure—Account.
199.	Bills—Statute Labour Roads and Bridges (Scotland).
205.	" Lunacy (Scotland)—Lords Amendments.
206.	" Highways—Lords Amendments.
207.	" Fortifications (Provision for Expenses) (amended).
208.	" Lunacy Regulation (amended.)
209.	" Excise Duties.
210.	" Parochial Assessments (as amended by Select Committee, and in Committee).
	Railways in India—Report by Juland Danvers, Esq.
	SESSION 1861.
324 (B 1.)	Poor Rates and Pauperism—Return (B.)
	Delivered on 17th July, 1862.
337.	Australian Coal—Return.
376.	St. Thomas's Hospital—Return.
412.	East India (Finance)—Paper.
211.	Bill—County Surveyors (Ireland) (as amended in Committee, and on consideration of Bill, as amended.)
	Delivered on 18th July, 1862.
383.	Fire Insurances—Return.
413.	Poor Law (Distress in Cotton Manufacturing District)—Copy of Mr. Farnall's reports.
212.	Bills—Local Government Supplemental (No. 2).
213.	" Copyhold, &c. Commission.
	Delivered on 19th and 21st July, 1862.
203.	Finance Accounts—Classes 1 to 7 (corrected pages).
399.	Debentures on Land (Ireland) Bill—Special Report.
405.	Spirits and Wine—Return.
408.	Superior Courts of Law (Fee Fund)—Paper.
415.	Registry of Deeds (Middlesex)—Returns.
422.	Post Office Packet Service—Statement of Excess of Expenditure.

423. Post Office Services (Revenue Departments) Do. do.
 402. Army (Grant's Cooking System)—Return.
 420. Custom House Duties—Return.
 427. Hong Kong—Return.
 214. Bills—Highland Roads and Bridges (amended).
 215. „ Weights and Measures (Ireland) (as amended in Committee, and on Re-commitment).
 216. „ Lunatics Law Amendment (amended).
 217. „ Militia Ballots Suspension.
 218. „ Polling Places (New Shoreham, &c.).
 219. Court of Common Pleas (Officer for acknowledgment of Deeds).
 220. „ Mutual Surrender of Criminals (Denmark).
 Customs—Sixth Report of the Commissioners.
 Belgium—Convention relative to Communication by Post.

Delivered on 22nd July, 1862.

430. Caledonian Canal—Fifty-seventh Report of the Commissioners.
 Turkey (Trial by Jury in Civil Cases)—Papers.

Delivered on 23rd July, 1862.

- 344 (2.) Thames Embankment Bill—Index to the Report.
 421. Sydney Branch Mint—Report from Committee.
 221. Bills—Juries (Lords Amendments).
 222. „ Elections during Recess.

Delivered on 24th July, 1862.

- 360 (1.) Fisheries (Ireland) Bill—Index to the Report from Committee.
 414. Public Accounts—Second Report from Committee.
 425. Friendly Societies (Scotland)—Report by the Registrar.
 429. Charges on Foreign Trade (Customs Act, 1860)—Report from Committee.
 432. Navy (Iron-cased Ships, &c.)—Return.
 439. Night Poaching Prevention Bill—Lords Report.
 417. Lunacy—Sixteenth Report of the Commissioners.
 224. Bills—Union Relief in Aid.
 225. „ Poor Relief (Ireland) (No. 2)—Lords Amendments.
 226. „ Corrupt Practices Prevention Act Continuance.
 227. „ Salmon Fisheries (Scotland)—Lords Amendments.
 228. „ Gunpowder Act Amendment.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, August 1st, 1862.]

Dated 27th March, 1862.

845. J. D. Schnitzer, Paris—An improved method for printing letters, numbers, musical or other characters or signs on maps, plans, sheets of music paper, or other similar impressions.

Dated 26th April, 1862.

1226. T. U. Brocklehurst, Macclesfield—Imp. in machinery for reeling singles, trams, organzines, and sewing silks.

Dated 2nd May, 1862.

1300. C. F. Whitworth, Sowerby Bridge, Yorkshire—Imp. in apparatuses for signalling upon railways.

Dated 21st May, 1862.

1530. J. Hopkinson, 235, Regent-street—Imp. in pianofortes, and in the hammer rails of pianofortes.

Dated 14th June, 1862.

1771. J. F. Miguel, Tours, France—An improved pessary.

Dated 21st June, 1862.

1827. B. Fabricotti, 150, Leadenhall-street—A polishing and grinding belt, formed of leather or other flexible or pliable material, having plugs composed of emery or other gritty substance, and a proper cement inserted in it substantially. (A com.)

Dated 4th July, 1862.

1948. J. Howard and J. Bullough, Accrington—Imp. in warping and beaming machines.

Dated 5th July, 1862.

1954. P. B. O'Neill, Warwick-street, Regent-street—Imp. in screw wrenches or spanners.

Dated 7th July, 1862.

1955. J. Kidd, Cannon-row, Westminster—Imp. in gas meters.

Dated 10th July, 1862.

1984. E. Jaudeau, 1, Guildford-road, Brighton—An improved method of, and apparatus for, removing the bad flavour from alcohols distilled from grain, beet root, or other vegetables, and for extracting the whole of the alcohol contained in the fermented juice.

1988. J. Ponti, 112, New Bond street—An improved apparatus for viewing photographic pictures, and the preparation of photographic pictures to be used in such apparatus. (A com.)

Dated 12th July, 1862.

2004. J. Abraham, Birmingham—Imp. in presses for raising or shaping metals.

Dated 14th July, 1862.

2018. A. A. Gannal, Paris—Certain imp. in the manufacture of bituminous cement.

Dated 16th July, 1862.

2042. R. Dunn, Newcastle-upon-Tyne—Imp. in furnaces for steam boilers and other purposes.

Dated 17th July, 1862.

2044. J. Dickson, 66, Tollington-road, Holloway—Imp. i the manufacture of caustic soda and carbonate of soda.

Dated 18th July, 1862.

2054. J. R. Abbott, Birmingham—Imp. in sliding chandeliers, gaseliers, and other pendant lamps.

Dated 19th July, 1862.

2060. R. Barrett, Stepney—Imp. in apparatus for working the damper of steam engine furnaces.

2062. A. Cotellet, St. Quentin, France—Imp. in the manufacture of alcohol.

2064. W. E. Newton, 66, Chancery-lane—Imp. in ordnance and projectiles for the same. (A com.)

2066. T. H. Saunders and J. Millbourn, Phoenix Mills, Dartford, Kent—Imp. in the manufacture of paper.

Dated 21st July, 1862.

2068. C. Ramsay, New Bond-street—An improved military cloak.
 2072. T. Davey, Tuckingmill, Cornwall—Imp. in the manufacture of gunpowder and explosive compounds.

2076. A. Phillips, Glasgow—Imp. in looms for weaving figured fabrics.

Dated 22nd July, 1862.

2078. S. Lord, and J. Lord, Facit, near Rochdale—Imp. in carding engines.

2082. J. Daniels, Leigh, Lancashire—Certain imp. in artificial manure.

2084. W. E. Gedge, 11, Wellington-street, Strand—An improved instrument for marking wadded or other stuffs. (A com.)

2086. H. R. Summons, Navarino-terrace, Dalston-road—An improved apparatus for bordering envelopes, paper, and cards.

2088. T. King, Spitalfields—Imp. in apparatus for measuring malt, grain, and other granular substances.

2090. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the treatment of the noxious gases or vapours produced in the distillation or purification of tar. (A com.)

Dated 23rd July, 1862.

2094. Z. Colburn, 15, Tavistock-street, Bedford-square—Imp. in apparatus for the condensation of steam in steam engines.

2098. E. Alcan, Coleman-street buildings—Imp. in machines for combing and carding wool and other filamentous materials. (A com.)

Dated 24th July, 1862.

2102. J. Horton, Birmingham—Imp. in breech-loading fire-arms. (A com.)

2104. H. Rawson and F. Staples, Leicester—Imp. in machinery for combing wool and other fibres.

2106. J. G. Clarke, Brackley, Northamptonshire—Imp. in scythes.

2108. W. Clark, 53, Chancery-lane—Imp. in machinery for the manufacture of fishing and other nets. (A com.)

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

2144. R. Thompson, Boston, U.S.—A new and useful improvement in lockstitch sewing machines.—29th July, 1862.

PATENTS SEALED.

[From Gazette, August 1st, 1862.]

August 1st.

- | | |
|--|---------------------|
| 289. T. M. Meekins. | 1371. W. Gossage. |
| 315. P. H. Astley & C. Leighton. | 1380. P. Tate. |
| 347. W. Clark. | 1450. C. T. Porter. |
| 366. J. Robb. | 1664. W. E. Newton. |
| 1283. H. F. Broadwood. | 1666. A. V. Newton. |
| 1334. J. Victor, J. Polglase, and W. Rounsevell. | 1690. A. V. Newton. |

[From Gazette, August 5th, 1862.]

August 5th.

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|-----------------------|-------------------------------------|
| 322. R. A. Brooman. | 384. T. Davison. |
| 324. P. Shaw. | 389. G. C. Burrows. |
| 325. H. A. Silver. | 393. J. E. McConnell. |
| 335. F. Tolhausen. | 447. G. T. Bousfield. |
| 337. J. Carrington. | 460. R. H. Skellern. |
| 340. J. Dickson. | 463. W. Hamer. |
| 345. G. Smith. | 492. T. N. Kirkham and V. F. Ensom. |
| 351. T. Fyfe. | 511. W. M. Cranston. |
| 359. R. Johnson. | 539. T. Bray. |
| 360. G. Lindemann. | 550. J. L. Charcouchet. |
| 362. F. J. Bolton. | 565. S. G. Reynolds. |
| 363. J. Hetherington. | 843. J. Haworth. |
| 374. T. Horsley. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, August 5th, 1862.]

July 2st

- | | |
|----------------------|----------------------|
| 1766. F. Haack. | 1768. A. B. Seithen. |
| 1770. H. J. Newcome. | 126. H. Medlock. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, August 5th, 1862.]

July 29th.

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|---------------------------------|-------------------|
| 1747. E. Hunt and H. D. Pochin. | 97. C. A. Girard. |
|---------------------------------|-------------------|

Journal of the Society of Arts.

FRIDAY, AUGUST 15, 1862.

INTERNATIONAL EXHIBITION OF 1862.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate of £452,300, have been attached to the Deed.

SEASON TICKETS.

Season Tickets may be obtained at the Society's House, on application to Mr. S. T. Davenport, Financial Officer. The prices of the tickets are as follows:—£2 10s., admitting to the International Exhibition and the Gardens of the Royal Horticultural Society every day during the remainder of the season; £1 10s., admitting to the Exhibition only, every day; and 10s., admitting to the Exhibition on shilling days only.

The delivery of the Medals and Certificates of Honourable Mention to the Exhibitors cannot take place till after the close of the Exhibition, when it will be made at a public ceremony in the building, to which will be admitted the holders of all classes of season tickets (except those for shilling days), and the public on payment of £1 each.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s.; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

It is intended to publish the Reports during the present month.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

AWARDS OF MERIT.

The following circular has been issued; a copy will be furnished to any exhibitor on application to the Secretary of the Society of Arts.

Society for the Encouragement of Arts, Manufactures,
and Commerce,
John-st., Adelphi, London, W.C., Aug. 1862.

SIR,—The Council of the Society of Arts have decided to invite the opinion of the Jurors, the Commissioners for the Colonies and for Foreign Countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and I am directed by the Council of the Society of Arts to transmit to you the accompanying Queries, with a request that you will favour them with your views on the subject, it being the intention of the Council to embody the answers they may receive in a public Report:—

- 1.—Are you of opinion that Awards for Merit, by Medals or otherwise, in International Exhibitions, are desirable?
- 2.—State the reasons for your opinion.
- 3.—Ought Works of Fine Art and Designs to be excluded from the Awards?
- 4.—Can you suggest any better method than the appointment of Jurors for making the Awards?
- 5.—Can you suggest any improvement in the Constitution or proceedings of the Juries?
- 6.—Is any Appeal from the decision of Juries desirable?
- 7.—If you think Awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?
- 8.—Have you any further suggestions to offer on the subject?

It is particularly requested that any replies with which you may favour the Council may be sent not later than the 15th of September, and that they may be written on foolscap paper, on one side only, with an inch margin, and numbered corresponding to the number of the questions.

I am, Sir,
Your obedient Servant,
P. LE NEVE FOSTER,
Secretary.

EXAMINATIONS.

The Programme of Examinations for 1863 is now ready, and two copies have been sent to each Institution in Union and Local Board. Additional copies may be had gratis on application to the Secretary.

The Papers set at the last Examination are now published in the form of a pamphlet, which may be had of Messrs. Bell and Daldy, Fleet-street. Price Sixpence.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October.

INTERNATIONAL EXHIBITION OF 1862.

VISITS OF SCHOOLS.

The following Return of Schools reported to Her Majesty's Commissioners as having visited the Exhibition, up to the 31st July, is here published in the hope that all those who feel how favourable must be the influence of such Exhibitions in forming the minds of young persons, will be induced to promote the visits of any Schools in which they may be specially interested :—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
June 2	Chelsea	Duke of York	Sir C. W. Dilke	100	473
" "	Do.	St. Saviour's	Do.	40	
" "	Do.	Trinity	Do.	100	
" "	Do.	St. Joseph's (Catholic)	Do.	40	
" "	Brompton	National	Captain Fowke... ..	155	
" "	Southwark	St. Stephen's	Rev. J. Amos	38	456
" 3	Golden-square	St. Thomas (Charterhouse)	Rev. W. Rogers	141	
" "	St. Luke's	St. Luke's	M. T. Fairbairn, Esq.	200	
" "	Streatham	Streatham	Rev. W. Hobson	77	
" "	Tunbridge Wells	Mount Zion	John Finch, Esq.	17	
" "	Fulham	St. Margaret's	Rev. A. Landrum	21	74
" 4	Barnes	Nassau	Professor Attwell	47	
" "	Chelsea	St. Jude's	Sir C. W. Dilke	20	
" "	St. John's-wood	Private	Miss Walsh	7	
" 5	New-road	Private	Miss Cooper	56	
" "	Lambeth	National (St. Andrew's)	C. J. Bevan, Esq.	21	478
" "	Peckham	" Myrtle House'	E. Steel, Esq.	14	
" "	Woodford	" Forrest House"	G. F. H. Sykes, Esq.	34	
" "	Notting-hill	Private	Miss Coa's... ..	18	
" "	Woolwich... ..	Do.	Mrs. Earls	11	
" "	Croydon	Society of Friends	Mr. Robinson	87	32
" "	Brixton	Private	Miss Johnson	13	
" "	Clapham	St. George's College... ..	Aimarus	17	
" "	East - street, Man- } chester-square }	Portman Chapel	Rev. J. W. Reeve	200	
" "	Bayswater	St. Matthew's (Orphan)	Rev. C. Smalley	7	
" 6	Tottenham	Grove House	Mr. Abbott	32	24
" 9	Framley, near Leeds.	Framley	Mr. Armitage	24	
" 10	Islington	Private	Reynolds and Son	15	
" "	Manchester	Unitarian	Subscription	52	
" "	Westminster	St. Margarets	T. J. Miller, Esq.	12	
" "	Hampstead	Christchurch (Girls)... ..	Rev. E. H. Bickersteth	18	123
" "	Canterbury	St. Paul's (Choir)	Rev. T. Huish	26	
" 11	Brixton	Private	Miss Thompson	10	
" "	Do.	Do.	Mr. Days	24	
" 12	Clapham	St. Joseph's College	Aimarus	13	
" "	Petersham... ..	Col. Russell's	Thos. Allen, Esq.	47	60
" 13	Pimlico	St. Barnabas	Subscription	23	
" "	Denmark-hill	Private	Mrs. Baynes	23	
" "	Southgate... ..	Do.	Subscription	13	
" "	Clapham	Clapham-park	Do.	12	
" 16	Brixton	Oberlin House	Subscription	17	17
" 17	Clapton	London Orphan Asylum (Girls)	{ A Member of the Stock } Exchange	135	
" "	Bayswater... ..	Choir School	Rev. W. Manning	24	
" "	Hampstead	St. John's	Mr. Kirkman	80	
" "	Faversham	Naval... ..	Lord Sondes	90	
" "	Wormwood-street	St. Ethelburgh... ..	G. Molineux, Esq.	12	458
" "	Hart-street	St. Olave's... ..	Rev. A. Povah	100	
" "	Margaret-street	All Saints... ..	Rev. W. W. Richards	17	

RETURN OF SCHOOLS (*Continued*).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
June 18	Camberwell	St. Matthew's	Mr. Bird	23	135
" "	Rochester	Cathedral	Subscription	27	
" "	Wandsworth	Patriotic Fund	Lord Colchester	23	
" "	Banbury	Private	Subscription	30	
" "	Islington	Do.	Miss Christie	16	
" "	Inverness-road	Do.	Mr. Stebbing	5	
" "	Pimlico	St. Gabriel's	Subscription	11	
" 19	Grosvenor-square	Grosvenor	Subscription	16	
" "	Bath	Bath Forum	Committee	14	
" "	Hampstead	Sailor's Home Orphan Girls	Subscription	60	
" "	Bayswater	St. Matthew's Orphan	Calvert Toulmin, Esq.	16	463
" "	Brighton	St. John's	Rev. A. Morgan	82	
" "	Bloomsbury	{ Refuge for Houseless and Des- titute Children }	Subscription	146	
" "	Richmond	British	Do.	22	
" "	Wandsworth	Patriotic Fund	Lord Colchester	18	
" "	Banbury	Sibford	Subscription	32	
" "	Drury-lane	Catholic	Rev. Father Rowe	38	
" "	Westminster	Female Home	Miss Stanley	19	
" 23	Wandsworth	Patriotic Fund	Lord Colchester	79	146
" "	Hoddesdon	British	Subscription	35	
" "	Banbury	Sibford	Do.	32	
" 24	Banbury	Sibford	Subscription	32	725
" "	Hornsey	Preparatory	Do.	30	
" "	Lambeth	Yorkshire Society	Do.	12	
" "	Gordon-square	Choir	Dr. Roe	12	
" "	Windsor	Free Industrial	Subscription	30	
" "	Horsham	" The Mercers"	Do.	120	
" "	Horsham, Sussex	Licensed Victuallers	Do.	163	
" "	Great Western-road	St. John's	Do.	19	
" "	Upper Holloway	Preparatory	Mrs. W. A. Thompson	30	
" "	Pimlico	St. Barnabas	Sister Superior	27	
" "	Clapton	Loudon Orphan Asylum (Boys)	{ A Member of the Stock Exchange }	250	
" 25	Wandsworth	Freemasons (Girls)	Committee	87	285
" "	Chatham	British	S. M. Dodson, Esq.	56	
" "	Kennington-park	All Saints (Choir)	Rev. J. Light	15	
" "	Farnham	National	Bishop of Winchester	116	
" "	Kilburn	Do.	The Organist	11	
" 26	Holloway	Caledonian	Duke of Buccleugh	129	329
" "	Chatham	St. Mary's (National)	Rev. M. Dyke	50	
" "	St. Giles	Refuge	Committee	14	
" "	Ealing	Blue Grove	W. R. Vines	33	
" "	Kingston, Surrey	Norbiton	Rev. R. Holberton	42	
" "	Clapham	Clarence House	Miss Millikin	14	
" "	Edgware-road	Ragged	Miss Warren	32	
" "	Houndsditch	Jews Free	H. Emanuel	15	
July 1	Hemmings-row	St. Martin's	Committee	24	372
" "	Kensington	Gray's-yard	Lady Holland	20	
" "	Huntingdon	Potter Brown's	Mr. Brown	97	
" "	Gordon-square	Choir	Dr. Roe	10	
" "	King-street	Home for Motherless Girls	Miss Glennie	22	
" "	Enfield	Trent	Rev. C. Skrine	29	
" "	Cobham	Cobham Sunday	Miss Shepherd	72	
" "	Witley	Lord Dudley's	Lord Dudley	24	
" "	Guildford-street	Foundling Hospital	The Governors	23	
" "	City of London	Castle Baynard Ward	Mrs. Millman	10	
" "	Teddington	Public	W. J. Wright	41	372
" 2	Kingston-on-Thames	Public	Subscription	37	
" "	Bow	Sailors' Orphan Asylum (Boys)	R. W. Hackwood, Esq.	13	
" "	Boxmoor	Boxmoor Choir	Subscription	32	
" "	Witley	Lord Dudley's	Lord Dudley	25	

RETURN OF SCHOOLS (*Continued*).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
July 2	Horsleydown	Queen Elizabeth's	Governors	190	327
" "	Highgate	British	Rev. J. Vinez & J. Clark, Esq.	30	
" 3	Queen's - sq., West- minster	Private	Sir Chas. Price	42	
" "	Goodman's-fields	Jews' Orphan Asylum	Subscription	41	299
" "	Harlow, Essex	St. Mary's	Do.	23	
" "	Fulham	All Saints'	Do.	56	
" "	Guildford-street	Foundling Hospital (Boys)	Governors	22	
" "	Do.	Do. (Girls)	Do.	21	
" "	Bloomsbury	St. George's	Rev. E. Bayley	19	
" "	Paddington	Grotto	Lord Radstock	22	
" "	Loughton, Essex	National	Subscription	26	
" "	Kensington	Industrial Choir	Rev. Stafford Brook	27	
" 7	Haverstock-hill	Family Home	Mrs. Bourne	21	93
" "	Sidney-street	St. Ann's	Convent Sisters	40	
" "	Brighton	National	Subscription	32	
" 8	Wellingboro'	Sunday	Rev. H. Broughton	44	251
" "	Guildford-street	Foundling Hospital	Governors	42	
" "	Winchmore-hill	Sunday	Subscription	20	
" "	Ealing	Do.	Mrs. Sarrell	14	
" "	Brixton	City of London Freeman's Orphans	Committee	105	
" "	Norwood	Westmoreland	Rev. J. Aston	26	
" 9	Clapham	Private	Mrs. Pipe	23	88
" "	Plumstead	Sunday	Rev. W. Rowley	65	
" 10	Streatham	Emanuel (Charity)	E. Bailey, Esq.	147	
" "	Camberwell	Denmark	Subscription	21	644
" "	Do.	Sunday	Do.	195	
" "	Hampstead	Christchurch	Do.	215	
" "	Walthamstow	British	Mrs. F. Barclay	49	
" "	Bayswater	St. Matthew's Orphan Home	Mrs. Franklin	15	
" 14	Totteridge	Totteridge-park	Mr. D. Munro	13	13
" 15	Guildford-street	Foundling Hospital	Governors	21	
" "	Harrow	Parochial	Subscription	30	
" "	Wandsworth	Infant Asylum	Governors	12	281
" "	Camberwell	St. Matthew's	Committee	63	
" "	Luton (Beds)	Clark's	Dr. F. Clark	43	
" "	Guildford	Brumley	Rev. H. B. Power	31	
" "	South-street	St. George's	Lady Rolle	51	
" "	Wokingham	St. Catherine's	{ J. Walter, Esq., M.P., & Thos. Harman, Esq. }	30	
" 16	Walthamstow	Private	Miss Barclay	21	
" "	Christchurch, City	Blue-coat	Governors	680	
" "	Windsor	British	Mr. Platt	20	
" "	Bushy Heath	National	Subscription	28	
" "	Marylebone	Charity	Mrs. Goold	45	844
" "	Wanstead	National	{ Revds. Messrs. Luard and Chambers ... }	50	
" 17	St. Pancras	National	Rev. C. W. Furse	20	
" "	Regent's-park	Ragged	The Teachers	7	106
" "	Camberwell	Female Domestic Mission	Miss Milner	27	
" "	Ewell	National	Sir Geo. Glyn	106	
" "	Welling (Herts)	Lord Dacre's	Lord Dacre	70	
" "	Hadlow (Kent)	Hadlow	Subscription	53	
" "	Wanstead	Infant Orphan Asylum	Do.	13	
" "	Croydon	Whitgift's	Do.	60	
" "	Sutton (Surrey)	South Metropolitan	Committee	52	
" "	Bayswater	St. Matthew's Orphans' Home	Mr. Saunders	10	
" "	Walthamstow	Private	Miss Barclay	45	
" "	Staines	Stanwells (Boys)	Sir J. Gibbons	15	
" "	Do.	Do. (Girls)	Miss Gibbons	20	

RETURN OF SCHOOLS (Continued).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
July 17	Harrow	National	Subscription	25	549
" "	Staines	Do.	J. J. Lane, Esq.	26	
" 18	Hambleton	Church Choir	Rev. W. H. Ridley	30	30
" 21	Marylebone	Charity	Mr. Henderson	46	418
" "	Stowe Market	British	Subscription	15	
" "	Heydon	National	L. Nulle, Esq.	18	
" "	Westminster-road	Yorkshire Society	Subscription	16	
" "	Salisbury	Baptist	Mr. J. Keynes	58	
" "	Bloomsbury	Christchurch (Sunday)	Mrs. W. Wetherde	32	
" "	Hampstead	Soldiers' Daughters' Home	Duchess of Somerset	105	
" "	Bloomsbury	Parochial	The Treasurer	128	
" 22	Hanover-square	St. George's (Females)	Lady Rolle	54	
" "	Clapham	British Orphan Asylum	Directors	32	
" "	Brixton	Christchurch	Rev. J. Hussey	57	551
" "	Wanstead	Orphan Asylum	Governors	36	
" "	Ealing	Christchurch Choir	Subscription	15	
" "	Horslydown	Queen Elizabeth's Grammar	Governors	357	
" 23	Spitalfields	Jews' Free	Mr. H. Emanuel	14	
" "	Walthamstow	Private	Miss Barclay	20	
" "	Wandsworth	Royal Patriotic (Boys)	Committee	25	
" "	Walham-green	St. John's	{ Mr. and Mrs. Freeman } and Mr. Jones	50	
" "	Chatham	Do.	Subscription	88	
" "	Seal, Kent	Seal	Rev. T. O. Blackall	74	
" "	Tring, Herts	Private	Lady de Rothschild	45	429
" "	London	Portuguese Infant Jews'	Committee	35	
" "	Bromley	St. Michael's	H. Currie, Esq.	48	
" "	Bevis Marks	Jews' Orphan	Committee	12	
" "	Doctors'-commons	Joy's (Females)	Do.	18	
" 24	Cirencester	Blue and Yellow	Rev. W. F. Powell	34	
" "	Wanstead	Infant Orphan Asylum	Committee	21	
" "	Woodford	Parochial	Do.	73	
" "	Staines	Wraysbury	Mrs. Scholefield	58	
" "	Romsey (Hants)	British	Governors	52	
" "	Do.	National	Lady Palmerston	65	349
" "	Walthamstow	Sunday	Mr. H. F. Barclay	46	
" 25	Puttenham	National	Rev. W. A. Duckworth	31	31
" 27	Ascot	Ascot Heath	Subscription	30	30
" 28	Southampton	Female Orphan Asylum	T. Perkins, Esq. (Mayor)	20	106
" "	Fleet-street	St. Bride's	Subscription	86	
" 29	Bloomsbury	Christchurch	Rev. G. Hamilton	40	281
" "	Westminster	Emanuel Hospital	Governors	70	
" "	Colnbrook	National	Rev. C. D. Goldie	91	
" "	Bayswater	Orphan Asylum	Mrs. Feron	8	
" "	Hungerford	Union	Mr. Cherry	42	
" "	Spitalfields	Jews' Free	Mr. H. Emanuel	30	
" 30	Christchurch	St. Mary's	Miss Lloyd	21	
" "	Hastings	Union	Subscription	28	
" "	Spitalfields	Jews' Free	Mr. H. Emanuel	16	
" "	Kilburn	Kilburn (Girls)	The Teachers	27	
" "	Eaton-square	Belgrave Chapel	Mrs. McGarell	33	281
" "	Wembley	St. John's	Rev. C. C. Layard	44	
" "	Wraysbury	Wraysbury	Mr. Scholefield	18	
" "	Alton	Lady de Rothschild's	Lady de Rothschild	12	
" "	Wandsworth	Royal Patriotic	Committee	23	
" "	Hitchin	Sunday (Friends)	Subscription	30	
" "	Windsor	The Queen's	Her Majesty	93	
" "	Edgware-road	St. John's	Mr. Prescott	9	
" "	Clare-market	Ragged	C. Randall, Esq.	17	

RETURN OF SCHOOLS (*Continued*).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
July 30	St. Mary, Bourne ...	Bourne's	Rev. W. Temple	30	421
" "	Hampshire	1st Friendly	Subscription	20	
" 31	Trent-park	Trent... ..	Rev. T. C. Bevan	33	411
" "	Bristol	St. Raphael's Choir... ..	Rev. A. H. Ward	27	
" "	Warwickshire	Charlcote	Rev. R. Hibbert	12	
" "	N. West London	Shoeblack	Mr. G. Hanbury	51	
" "	St. George's, Han- over-square ... }	Female Orphan	Hon. Mrs. Cowper	10	
" "	Wanstead	Orphan Asylum	Mr. Green... ..	25	
" "	St. Pancras	Agar Town	Rev. R. P. Clemenger	11	
" "	Bedford	National	Rev. H. V. Lebas	60	
" "	Colnbrook	National	Mr. Ibotson	69	
" "	St. John's	Industrial	W. Marshall, Esq.	26	
" "	Walthamstow	Sunday	Mrs. H. F. Barclay	49	
" "	Italy	Mechanics'	Government	38	411

MITCHEL'S TYPE-COMPOSING AND DISTRIBUTING MACHINES.

The invention comprises two distinct machines—one for Composition and another for Distribution. They are shown in the Machinery Department of the International Exhibition, and have received the award of a medal.

The "Compositor" is in shape a right-angled triangle, placed horizontally, with a key-board at the base, furnished with thirty-nine keys. Each key, when pressed, strikes out a type from one of an equal number of brass slides standing at an incline upon the machine in a row nearly parallel with the key-board. The type thus liberated is conveyed upon an endless band, moving in a direction at right angles with the key-board, to another band (forming the hypotenuse of the triangle) which carries it on to its destination. Arrived here, it is placed on end and pushed forward, to make room for the next type, by means of a serrated wheel. The words are thus put together with great rapidity, in a long line of about thirty inches, which is afterwards divided by the Compositor into lines of the required length.

The principle of the machine consists in the combination of bands of lengths and velocities of revolution so varied as to enable the types, at different distances from the wheel, to reach it in the order in which the keys are struck.

The machine is stated to be capable of setting up types at the rate of six letters per second, or 21,600 per hour; but as the human fingers cannot attain to such rapidity, and allowance must be made for the operations of "justifying" and "correcting," the work of an average trained operator will probably not exceed 24,000 or 25,000 ens per day, which is about equal to the work of two men setting up type in the ordinary mode. As each machine can employ two operators, the daily production would be about 50,000 ens.

The "Distributor" is a small machine, of circular form. The lines of type to be distributed are placed successively in a long channel, in which they are pressed forward by a spring towards a vibrating metal 'finger.' By this finger each type is separated from the line, pushed aside, and dropped on to a grooved brass wheel revolving horizontally. In the grooves of this wheel pins are placed, on which the types are hung, by means of nicks, the ends of the types projecting below the under surface of the wheel at distances varying according to the position of the nicks. As each letter arrives over its receptacle, it is lifted off its pin, and dropped into its place, being pushed a little for-

ward to make way for the next arrival. When the line is filled in this way, it is removed by the boy to the "Compositor."

The "Distributor" is self-acting, and requires only the attention of a boy. It is stated to distribute 8,000 letters per hour.

Both machines have been used with types ranging in size from great primer to brevier. They have been worked for several years in America, and have been recently introduced into the establishments of some of the most eminent printers in England and Scotland. As compared with the present mode of type-setting, the following advantages are claimed by the inventor for these machines:—

I. An economy of labour varying from 30 to 50 per cent., according to the character of the work. It is stated that one boy who has been trained to the Composing Machine can do as much work as two journeymen by the ordinary method, and that a boy who has practised at the composing machine for six months, can do as much work as a journeyman by the ordinary method, after taking from four to five years to learn his trade; that a boy, after a week's practice at the Distributing Machine, can distribute as much type as a journeyman by manual labour.

II. Greater facility in acquiring the Printer's art, whilst it renders his occupation comparatively light and healthy.

III. Decrease in the wear of type, as the face of the type is never touched during either process, and "shaking up the cases" is done away with; and that a smaller quantity suffices for a given amount of work.

These results are illustrated by the performance of three apprentices—one trained to the machines in the office of Mr. John F. Trow, of New York; the others in the establishment of Messrs. Spottiswoode and Co., of New-street-square, by whom the machines exhibited are worked, and who have recently printed various books by their means.

Mr. Mackenzie, of Glasgow, has also used the machines in setting up a bible, of which a copy is placed in the Exhibition as an elegant specimen of typography. They are also in operation in Messrs. Childs' offices at Bungay.

Mr. Trow, of New York, has used these machines for several years; and in a letter to Mr. Mitchel (the Inventor), under date May 24, 1859, he gives a long list of works wholly composed by them, ending with the English bible, 1,086 pages, of which he observes:—

"This last work has just been completed; and, as it is the most difficult of any on account of the excess of

capitals and figures, I will give you the result of the working of the machines on this only:—

"The 1,086 pages were composed on two composing machines, and the distribution was done on two distributing machines. The entire bible measured 3,261,258 ems, and was set up in sixty days by three apprentices and one journeyman, the distribution being done by two boys, at a cost as follows:—

769 pages by 3 apprentices, at two-third price	Dollars.	192 25
317 " 1 journeyman		120 00
2 boys for distribution, and 1 for other purposes		65 00

377 25

This was done on 1,000 lbs. of type.

The same work, done by hand composition, would cost:—

769 pages by three apprentices, at two-third price	430 64
317 " 1 journeyman	266 28

696 92

"To do the work in this way within the 60 days, would require at least 10 journeymen and 2,000 lbs. of type. The machines are so simple in construction and principle that my boys manage them with perfect facility."

AWARD OF PRIZES FOR PAINTING WORK.

The Painters' Company, which has latterly been giving an annual exhibition of painting work at its old hall in the City, this year determined to award its prizes to exhibitors in the International Exhibition. In compliance with this resolution the master of the company (J. Comfort, Esq.), and Messrs. Laing, Cobbet, and Barber (members of the Court of Assistants), on the part of the company, and Messrs. Taylor (of Clement's-lane), and Munro (of Islington), on the part of the trade, visited Class 30 at the International Exhibition, and after several hours' examination of the painting work in that department, awarded the following prizes:—

For Graining, a silver medal to Mr. J. Kensett, for No. 5,902. A bronze medal to Mr. W. A. Grant, for No. 5,888.

For Marbling, a silver medal to Mr. Reed, for No. 5,917. A silver medal to Mr. I. Bradley, for No. 5,672, for tables painted in imitation of Devonshire marbles. A bronze medal to Messrs. Maslin, for No. 5,908.

For Writing, a bronze medal to Mr. W. Pitman, for the writing in No. 5,914.

For Decoration, a silver medal to Mr. J. L. Coulton, for an allegorical arabesque decoration, No. 5,883. A bronze medal to Mr. J. H. Earle, for a drawing-room decoration, No. 5,885. A certificate of merit to Mr. G. Lainson, for pilasters painted on satin, No. 5,904.

They also make honourable mention of No. 5,918, by J. and J. Rogers, a fine design; and of No. 5,690 by Messrs. Cox and Co., the writing on the altar-piece; but as the principle of the company is to give the prize to the actual performer of the work, they could not make an award, not knowing the names of the workers.

EXAMINATION PAPERS, 1862.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(Continued from page 596.)

MINING AND METALLURGY.

THREE HOURS ALLOWED.

Six Questions to be answered.

1. What do you understand by the term standard, as applied to copper ore?

2. Describe the processes commonly employed for the extraction of gold from auriferous quartz, and state the precautions it is necessary to take in order to avoid loss.

3. To what metallurgic treatment would you subject an ore of lead containing 40 per cent. of that metal existing in the form of galena, intimately mixed with other sulphides, from which it cannot be economically separated by washing, &c.?

4. Describe the method ordinarily employed in this country for the assay of copper ores, and give the humid process of assay applicable to copper ores of low produce.

5. Where are tin ores generally found, and in what way is tin-dressing usually conducted?

6. Describe in outline, the English method of copper smelting as practised at Swansea.

7. How is the roasting of iron ores generally conducted, and what are the peculiarities of the blast furnaces commonly employed in the Scotch iron districts?

8. What is an adit level, and what are its uses and advantages?

9. Describe the action of the cataract in the Cornish pumping-engine.

10. What is "fire damp," and of what is "choke-damp" principally composed?

11. Describe the method of securing a pit by means of cast-iron tubbing, and illustrate by a rough sketch.

12. What are the distinctive differences between the coals of the North of England and those from the South Wales district?

POLITICAL AND SOCIAL ECONOMY.

THREE HOURS ALLOWED.

1. By what tests do you distinguish a duty imposed for protection from a duty imposed for revenue?

2. If the malt-tax were repealed, who would be the chief gainer; and in what way would the repeal benefit the landowner and tenant-farmer?

3. Under what circumstances, and in what way, is a State enabled to reduce the interest payable on any part of its funded debt.

4. What do you understand by the principle of land-sale in colonies—commonly ascribed to Mr. Wakefield?

5. Note some of the most important points in the last Census as compared with that of 1851.

6. How far is it true that improvements in machinery provide a compensation for those whom they throw out of employ?

NOTE.—Candidates are recommended to select only one of the three following questions.

1. What are the economical benefits of the International Exhibition, and what, if any, may be its ill-effects?

2. Describe the condition of a ryot, and explain historically the ryotwary and zemindary systems in India.

3. What are the most important commercial treaties which England has ever had with other countries, and what have been their advantages and disadvantages?

DOMESTIC ECONOMY.

THREE HOURS ALLOWED.

1. Explain what you understand by domestic economy, and enumerate under different heads what you think it embraces.

2. Which would you consider more economical, a badly drained and ventilated house at a low rent, or a dwelling perfect in these respects at a higher rent? State fully the reasons for your answer.

3. A bedroom which is occupied every night, contains a fire-place and a sash window, both sashes of which open; explain minutely what you would do with the door, the window, and the bedding every morning. If no fire were

required in the room, would you do anything to the fire-place?

4. Mention some of the rules which should be observed in the general management of a sick room, with the reasons for their observance. How would you treat a scald or a burn?

5. How do bathing and ventilation conduce to health?

6. A case of scarlet fever occurs in a house adjoining the one in which you reside; what measures would you take to prevent the infection extending to your own dwelling?

7. Explain exactly the reasons for and against any articles of food usually prepared for young children.

8. What are the different kinds of food used in this country? Give reasons why a mixed diet is preferable to one consisting of only one or two articles.

9. Give two recipes for soup, one with meat, the other without meat.

10. How would you boil a joint of meat so as to preserve its juices and tenderness.

11. Give full directions for cooking green vegetables.

12. Describe the process of making bread, and calculate the advantages of making it at home.

13. How would you prepare mutton broth and beef tea for a sick person?

14. Give directions for the prevention and treatment of colds, sore throats, and fever.

15. How does economy in household matters promote domestic happiness and comfort?

16. What are the advantages of linen over cotton, and cotton over linen?

17. What are the present prices of the ordinary articles of food and clothing? Mention the causes of their fluctuation in price, and how to provide them cheap in price, and good in quality.

18. What interest is usually given in Savings' Banks? Why is the rate of interest not higher? What practical rules of precaution would you observe with respect to the investment of your savings?

SUPPLEMENTAL QUESTIONS.

(a) In preparing pickles or preserves in a brass or copper pan, what precaution would you adopt to prevent, as far as possible, contamination with the poisonous metal of the vessel?

(b) How would you test pickles, if you suspected that they contained copper?

(c) How would you treat a person who had partaken freely of food contaminated with copper?

GEOGRAPHY.

THREE HOURS ALLOWED.

The candidate is to select for answer any *twelve* of the following questions. Not more than twelve are to be answered, but it is imperative that either Nos. 1 or 2 (or both, if preferred by the candidate) shall be amongst those chosen for the purpose.

1. Draw roughly a Map of any county in the British islands—showing its general shape and chief physical features, as high grounds, rivers, &c. (If the county selected include a coal-field, or other important mineral deposit, mark the locality.)

2. Draw a rough Map—showing one of the under-mentioned river-basins, and marking on it the places of any principal towns situated either upon the main stream or its tributaries.

- (a) The Clyde.
- (b) The Severn.
- (c) The Thames.
- (d) The Shannon.

3. In what counties are Leominster, Bridport, Coventry, Colchester, Halifax, Boston, Macclesfield, Cheltenham, Wrexham, Bodmin, Aberystwith, and Blackburn?

4. Name, in geographical succession, the counties that lie along the east coast of Britain, from the North point of Scotland to the South Foreland, with one or more of the chief towns in each.

5. What counties fall within the province of Ulster; and by what conditions is that province distinguished from other parts of Ireland?

6. Name any twelve of the great seaports of continental Europe, specifying the locality of each.

7. Draw up a list of the principal political divisions of Germany, naming the capital of each.

8. Enumerate the countries that lie around the Mediterranean Sea, throughout its circuit, naming one or more of the seaport towns belonging to each.

9. Explain, from geographical considerations, the well-known points of difference between the climates of Eastern and Western Europe, within similar latitudes.

10. Write a brief sketch of the physical geography of British India, so far as relates to—mountains, plains, rivers, and climate.

11. Draw up a table of the West India Islands, naming the countries to which they respectively belong.

12. Give some account of New Zealand, as to its natural features, commercial productions, and general condition.

13. From what countries are the following articles chiefly derived—rice, sugar, indigo, coffee, dates, sago, arrow-root, cinnamon, cocoa-nuts, and palm oil?

14. Give some account of the phenomena known in physical geography as land and sea breezes, and say how they are to be explained.

15. Say what you know concerning the nature and origin of glaciers.

ENGLISH HISTORY.

THREE HOURS ALLOWED.

1. What were the chief distinctions of rank under the Anglo-Saxons?

2. Why was Domesday Book compiled, and what main particulars does it give us as to the state of England in the eleventh century?

3. Mention the principal provisions of Magna Charta?

4. What claim did Edward III. advance to the Crown of France, and what were the principal effects of the French wars upon English history?

5. Give, with dates, a short outline of the history of Henry VIII.

6. Mention the principal Acts passed under Queen Elizabeth that have relation to the state of religion or to the labouring classes.

7. Give, with dates, a short Life of Charles I.

8. Sketch briefly the state of the country at the accession of James II.

9. Relate briefly the circumstances of James II.'s downfall and deposition.

10. What are the chief articles in the Bill of Rights?

11. Give a short account of the Jacobite rebellion of 1745.

12. Write a life of Lord Clarendon, Lord Bolingbroke, or Lord Chatham.

13. Describe the battle of Agincourt, of Flodden Field, or of Blenheim.

14. Contrast the British dominions in 1175, in 1560, and in 1764.

ENGLISH LITERATURE.

THREE HOURS ALLOWED FOR THE TWO AUTHORS SELECTED BY THE CANDIDATE.

CHAUCER.

SECTION I.

1. Wyd was his parish, and houses fer asondur,
But he ne lafte not fer reyne ne thondur,
In siknesse ne in meschief to visite
The ferrest in his parische, moche and lite,

Upon his feet, and in his hond a staf.
 This noble ensample unto his scheep he gaf,
 That first he wroughte, and after that he taughte,
 Out of the Gospel he tho wordes caughte,
 And this figure he addid yit thereto,
 That if gold ruste, what shulde yren doo?
 A gentle Maunciple was ther of a temple,
 Of which achatours mighten take exemple
 For to be wys in beyying of vitaille.
 For whethur that he payde, or took by taille,
 Algate he wayted so in his acate,
 That he was ay biforn and in good state.
 A monk ther was, a fair for the maistrise,
 An out-rydere, that loved venerye;
 A manly man, to ben an abbot able.

(a) Turn each of the above passages into modern English.

(b) Explain the obsolete words and constructions.

(c) Scan the first passage.

2. In what sense does Chaucer use the following words and phrases:—

swynk	rette	mormal
now draweth cut	wonyng	lewed
our althur cok	golyardeys	lodemenage.

3. Explain the following passages:—

(a) The reule of Seynt Maure or of Seint Beneyt,
 Because that it was old and somdel streyt,
 This ilke monk leet forby hem pace.

(b) In termes hadde caas and domes alle,
 That fro the tyme of king Will were falle.

(c) Seynt Julian he was in his countré.

(d) Wel cowde he fortune the ascendent
 Of his images for his pacient.

SECTION II.

1. What do you consider the peculiar merits of the Prologue to the Canterbury Tales? Illustrate your answer by quotations and references.

2. Give the characters of the Pardoner and the Nun, as described by Chaucer.

3. What book is supposed to have suggested to Chaucer the scheme of the Canterbury Tales? In what respect is the original improved upon?

4. Sketch the life of Chaucer.

SHAKESPEARE.

Hamlet; Henry V. The Tempest.

SECTION I.

1. In what connexions do the following passages occur? Explain the allusions, obsolete words, and peculiar constructions:—

(a) See, what a grace was seated on this brow;
 Hyperion's curls; the front of Jove himself;
 An eye like Mars to threaten and command;
 A station, like the herald Mercury
 New-lighted on a heaven-kissing hill.

(b) There is some soul of goodness in things evil,
 Would men observingly distil it out;
 For our bad neighbours makes us early stirrers,
 Which is both healthful and good husbandry.

(c) Would not this, sir, and a forest of feathers (if the rest of my fortunes turn Turk with me), with two provincial roses on my rais'd shoes, get me a fellowship in a cry of players, sir?

(d) Rightly to be great,
 Is, not to stir without great argument;
 But greatly to find quarrel in a straw,
 When honour's at the stake.

(e) We are such stuff
 As dreams are made of, and our little life
 Is rounded with a sleep.

2. Turn the following passages into simple prose. Whence are they taken?

(a) Give thy thoughts no tongue,
 Nor any unproportion'd thought his act.
 Be thou familiar but by no means vulgar.
 The friends thou hast, and their adoption tried,
 Grapple them to thy soul with hooks of steel;
 But do not dull thy palm with entertainment
 Of each new hatch'd, unfledg'd comrade. Beware
 Of entrance to a quarrel; but, being in,
 Bear't, that th' opposed may beware of thee.

(b) For several virtues
 Have I liked several women; never any
 With so full soul, but some defect in her
 Did quarrel with the noblest grace she ow'd,
 And put it to the foil.

(c) Thus conscience does make cowards of us all;
 And thus the native hue of resolution
 Is sicklied o'er with the pale cast of thought;
 And enterprises of great pith and moment,
 With this regard, their currents turn awry,
 And lose the name of action.

SECTION II.

1. What allusions to contemporary events are to be found in Hamlet and Henry V.?

2. Sketch the character of Polonius.

2. Give some account of the original story on which Hamlet is founded. Discuss the character of Hamlet.

4. State briefly the plot of the Tempest.

5. In what particulars does Shakspeare deviate from historical accuracy in Henry V.

MILTON.

(Comus; Samson Agonistes; Lycidas; L'Allegro;
 Il Penseroso; Hymn on the Nativity.)

1. Explain the following passages, and state in what connections they occur:—

(a) But he, that hides a dark soul and foul thoughts,
 Benighted walks under the mid-day sun;
 Himself is his own dungeon.

(b) Fame is no plant that grows on mortal soil,
 Nor in the glistering foil
 Set off to the world, nor in broad rumour lies;
 But lives and spreads aloft by those pure eyes,
 And perfect witness of all-judging Jove:
 As he pronounces lastly on each deed,
 Of so much fame in heaven expect thy meed.

(c) Hence vain deluding joys,
 The brood of folly without father bred!
 How little you bested,
 Or fill the fixed mind with all your toys.

(d) Perhaps
 God will relent, and quit thee all his debt;
 Who evermore approves, and more accepts,
 (Best pleased with humble and filial submission)
 Him, who, imploring mercy, sues for life,
 Than who, self-rigorous, chooses death as due;
 Which argues over-just, and self-displeased
 For self-offence, more than for God offended.

2. Explain the allusions in the following passages:—

(a) Bacchus, that first from out the purple grape
 Crushed the sweet poison of misused wine,
 After the Tuscan mariners transformed,
 Coasting the Tyrrhene shore, as the winds listed,
 On Circe's island fell.

- (b) Return, Alpheus; the dread voice is past,
That shrunk thy streams.
- (c) Sometimes let gorgeous Tragedy
In sceptred pall come sweeping by,
Presenting Thebes, or Pelops' line,
Or the tale of Troy divine.
- (d) The Libyck Hammon shrinks his horn;
In vain the Tyrian maids their wounded Thammuz
mourn.

- (e) I have oft heard
My mother Circe with the sirens three,
Amidst the flowery-kirtled Naiades,
Culling their potent herbs, and baleful drugs;
Who, as they sung, would take the prison'd soul,
And lap it in Elysium.

3. Turn the following passage into simple prose:—

- (a) So virtue, given for lost,
Depressed and overthrown, as seem'd,
Like that self-begotten bird
In the Arabian words embost,
That no second knows nor third,
And lay erewhile a holocaust,
From out her ashy womb now teem'd,
Revives, reflowerishes, then vigorous most
When most unactive deem'd;
And though her body die, her fame survives
A secular kind ages of lives.

4. Explain the following words and phrases:—

paranymph	foil	love-lorn
unbleached	rather	unacquainted feet
infamous hills	dight	glozing
nepenthes	serannel	pinfold

SECTION II.

1. Give some account of the origin of *Comus*.
2. What objections have been urged against *Lycidas*? How would you answer them?
3. Sketch the argument of *Samson Agonistes*?
4. What was the design of *L'Allegro* and *Il Penseroso*? Illustrate your answer.
5. What are the laws of the metre of Milton's *Comus*? Scan any six lines you recollect.

ISAAC WALTON.

Lives of Hooker, Herbert, and Sanderson.

1. Sketch the Life of George Herbert.
2. "*The forenoon Sermon, spake Canterbury; and the afternoon Geneva.*" Explain this passage.
3. Sketch the Life of Hooker after his departure from the Temple.
4. What was the design of Hooker's treatise "*Of the Laws of Ecclesiastical Polity*?"
5. Give some account of Herbert's poems.
6. Sketch the early life of Bishop Sanderson.
7. What do you know of the Quinquarticular Controversy?
8. Explain the following allusions:—

(a). "An amity like that of St. Chrysostom's to his dear and virtuous Olympias, whom in his letters he calls his Saint; or an amity, indeed, more like that of Saint Hierome to his Paula."

(b). "He was attended by the great secretary of nature and all learning, Sir Francis Bacon."

(c). But it so fell out, that about the third or fourth year of the Long Parliament, the then present person of Bourne was sequestered—you may guess why—and a Genevan put into his good living."

9. What do you consider the peculiar excellences of Walton's *Lives*?

10. Quote, or give the substance of, any four passages from the *Lives*, which have struck you as being particularly beautiful.

COLERIDGE.

(Ancient Mariner; Christabel; Translation of Wallenstein.)

SECTION I.

1. Explain and give the context of the following passages:—

(a) Perhaps 'tis pretty to force together
Thoughts so all unlike each other;
To mutter and mock a broken charm,
To dally with wrong that does no harm.
Perhaps 'tis tender too and pretty
At each wild word to feel within
A sweet recoil of love and pity.
And what, if in a world of sin
(O sorrow and shame should this be true!)
Such giddiness of heart and brain
Comes seldom save from rage and pain,
So talks as it's most used to do.

(b) 'Tis not merely
The human being's pride that peoples space
With life and mystical predominance;
Since likewise for the stricken heart of love
This visible nature, and this common world,
Is all too narrow; yea, a deeper import
Lurks in the legend told my infant years,
Than lies upon that truth we live to learn.
For fable is love's world, his house, his birthplace;
Delightedly dwells he 'mong fays and talismans,
And spirits; and delightedly believes
Divinities, being himself divine.

2. Turn the following passages into simple prose, and state where they occur:—

(a) Not every one doth it beseem to question
The far-off Arcturus. Most securely
Wilt thou pursue the nearest duty—let
The pilot fix his eye upon the pole-star.

(b) Know that the human being's thoughts and deeds
Are not, like ocean billows, blindly moved.
The inner world, his microcosmos, is
The deep shaft out of which they spring eternally.
They grow by certain laws, like the tree's fruit—
No juggling chance can metamorphose them.

(c) He stood beside me, like my youth,
Transformed for me the real to a dream,
Clothing the palpable and familiar
With golden exhalations of the dawn.
Whatever fortunes wait my future toils,
The beautiful is vanished—and returns not.

SECTION II.

1. What is the peculiarity of the metre of *Christabel*? Scan any passage from it not exceeding twelve lines.
2. Sketch the character of *Thekla*.
3. What do you conceive to be the design of the *Ancient Mariner*.
4. Compare the characters of Octavio Piccolomini and his son.
5. State briefly the plot of the first part of *Wallenstein*.

TRENCH.

(On the Study of Words.)

1. Johnson calls language "the pedigree of nations." Illustrate this remark.
2. Give instances of words bearing witness to great moral truths.

3. Give some account of the processes by which new words are introduced into a language.

4. "Many a single word also is itself a concentrated poem." Illustrate this from examples not given by the author.

5. How do you account for words becoming obsolete? Give instances.

6. Define the term synonym, and show how, as generally used, it is a misnomer.

7. Distinguish between arrogance and presumption—to hate and to abhor—divers and diverse—interference and interposition.

8. How do you account for the fact that in the English language many words have duplicates and triplicates? Give examples.

9. Explain and give the origin of the following words:

lunacy	calculate	savage
maudlin	sardonic	miscreant
damask	mercurial	quarantine
poltroon	kickshaws	dragonnade

10. What were the original meanings of the following words:—recreant—churl—candidate—boor—lewd—kind—plague—demure—canon.

11. What philological objections are there to a phonetic mode of spelling? Illustrate your answer.

REED.

Introduction to English Literature, from Chaucer to Tennyson.

1. Define Literature.

2. Give the substance of Reed's remarks on true catholicity of taste.

3. "The beginning of a just knowledge of the English language is an accurate sense of its northern origin." Illustrate this remark, (a) from its grammar (b), from its vocabulary.

4. Distinguish clearly between *shall* and *will*.

5. Give some account of the writings of Chaucer.

6. Account for the rapid advance of English literature in the sixteenth century.

7. Give some account of two of our earliest great prose writers.

8. Name the chief works of Milton, and state the subject of one of them.

9. Why has the reign of queen Anne been styled the Augustan age of English Literature?

10. "The author is more or less *what* he is, because he is *where* he is." Illustrate this remark.

11. What has chiefly contributed to the decline of Byron's popularity?

12. Name our chief humorous writers, and give a brief analysis of one of their greatest works.

13. State the subjects of the following poems:—The Excursion, The Task, The Dunciad, Absalom and Achitophel, the Mirror for Magistrates.

14. Give some account of the periodical literature of the eighteenth century.

(To be continued.)

Home Correspondence.

RICE GLASS FROM JAPAN.

SIR,—Among the curious objects in the Japanese Court of the International Exhibition, are some specimens which are exciting great curiosity, from the name given to them, viz., that of rice glass. It has been stated in several journals that this glass is made from the albumen of rice, and wonder has been expressed as to the process by which so unpromising a material has been transmuted. I have examined the glass in question, and am prepared to say that it differs in no important particular from ordinary silicate

of soda or potash. It is made from the sand obtained from the washing of the rice, and also, I imagine, chiefly from the husk obtained during the cleaning. The latter is particularly rich in silica, and that in a minutely-divided state, admirably adapted for the wants of the glass maker, who has only to combine it with a due proportion of alkali, and raise it to the proper temperature to obtain a vitrified material.

I trust you will excuse my troubling you on so trifling a matter. I am, &c., C. T.

King's College, London, August 9th, 1862.

Proceedings of Institutions.

NEWPORT (MONMOUTHSHIRE) ATHENÆUM AND MECHANICS' INSTITUTE.—The twenty-first annual report says that in their last annual report the directors expressed regret that the Institute then laboured under a heavy debt (£85), but they also expressed the hope that by the strictest economy, and the co-operation of the members, it might, at the close of the year, be placed in a much more favourable position. The directors have now much pleasure in announcing that this hope has been fully realised; the heavy debt has been paid, and upwards of £20 expended on the library, and at the present moment the Institute is entirely free from debt. To obtain these very desirable results the directors, after mature consideration, resolved to adopt two measures—the first an excursion to Ilfracombe, which failed from circumstances over which the directors had no control; the second, a fête on the marshes (gratuitously lent for the occasion by the then lessee, the secretary), resulted in a gain to the Institute of £64 17s. 6d. The directors have transferred from the building fund the amount expended out of the annual income of the institute in alterations of the building. They would have been better pleased had they been able to dispense with this amount, and have reserved it to be expended exclusively on the library; but the fact cannot be disguised that with its present number of members the Institute is not self-supporting. With much pleasure the directors congratulate the members on the fact that the present convenient building is entirely their own. To the friends of the Institute by whose liberality this gratifying result has been attained, they desire to express their sincere thanks; and to the hon. secretary and secretary, by whose unceasing exertions, solely, the amount required has been collected, the members owe a deep debt of gratitude. A small sum is still required to make a few necessary improvements, and when this is obtained, a statement of accounts will be forwarded to each contributor. The directors regret that their efforts to form any classes have failed from causes they cannot explain; but having the very convenient class room at their disposal, they decided to allow it to be used for the practice of chess and draughts, and they believe, from the constant use of it, that the members appreciate this extra privilege. The accounts show that the amount received during the current year was £387 17s. 2½d.; the expenditure has been £324 9s. 3d.; repaid secretaries' balance as per last report, £46 16s. 3½d.—£371 5s. 6½d.; leaving a balance in hand of £16 11s. 8d. The liabilities amount to £15 2s. 4d.; showing a balance of £1 9s. 4d. in favour of the Institution after all liabilities are discharged. The following is the comparative statement of members for the years 1860-61, and 1861-62:—

		20th April, 1861.				20th April, 1862.		
Annual and Honorary	170	yielding	£	s. d.	155	yielding	£	s. d.
First Half-year	25	"	4	12 0	28	"	5	2 0
Second ditto	38	"	6	13 0	36	"	6	2 0
First Quarter	118	"	10	7 0	111	"	9	1 6
Second ditto	90	"	7	2 0	140	"	11	7 6
Third ditto	171	"	14	3 6	170	"	13	6 6
Fourth ditto	147	"	13	0 6	209	"	17	1 0
			£134	0 0			£136	18 0

The average number of members per quarter is 345 for the present year, being an increase over the preceding year of 9 per quarter. The present number of members is 400. In consequence of the heavy loss sustained during the preceding year, the directors have considerably diminished the number of lectures usually given, and they are pleased to report that a slight profit has been realised from this source. The total receipts amount to £39 5s. 0½d.; the fees to lecturers and other expenses amount to £33 15s.: leaving a profit of £5 10s. 0½d. The following is a list of lectures and entertainments:—Mr. Basil Young "Shadows on the Wall," and "The Man in the Moon;" The Rev. H. Stowell Brown, "The People's Proverbs;" Mr. George Grossmith, "English Notions of American Character;" The Rev. A. Mc Auslane, "Matrimony;" Mr. J. K. Applebee, "The Three Graces of Womanhood." The attendance has been as follows:—Members, 604, non-members, 192; ladies introduced by members, 278: total attendance at six lectures, 1,074; averaging 179 per lecture, which, compared with last year, shows an increase of 67 per lecture. The library now contains 3,346 volumes. The directors have expended the sum of £20 12s. 10d. in the purchase of new books and binding periodicals. The increase in the library has been:—Books presented, 36; purchased, 92; periodicals and magazines bound, 53:—total increase during the year, 181. The number of volumes circulated has been 10,867, which, compared with the previous year, shows an increase of 385 volumes. The directors desire once more to express their high opinion of the valuable services rendered to the Institution during a period of six consecutive years by the honorary secretary, Mr. John Wood, to whose untiring exertions the present successful position of the Institute is mainly attributable.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, August 8th, 1862.]

Dated 10th April, 1862.

1023. W. Nunn, 179, St. George-street, St. George's in the East—Imp. in the construction of lanterns for ships and signals.

1043. W. E. Gedge, 11, Wellington-street, Strand—An improved lamp for lighting mines. (A com.)

Dated 11th April, 1862.

1096. T. Edwards and J. Harrison, Liverpool—Imp. in letter-receiving boxes and other like receptacles.

Dated 16th April, 1862.

1155. S. P. Matthews, Wolverhampton—Imp. in vices.

Dated 21st April, 1862.

1212. J. T. Davies, Liverpool—Imp. in circuit horse powers. (A com.)

Dated 25th April, 1862.

1526. M. Vogl, Sambrook-court—Improved apparatus for protecting houses and other buildings from burglars.

Dated 20th May, 1862.

1797. J. Wheather, Lee Mill and J. Townend, Pippin Bank, Bacup—Imp. in self-acting and other mules for spinning cotton or any other fibrous substances.

Dated 18th June, 1862.

1915. E. F. Prentiss, Birkenhead—Imp. in the construction of omnibuses and other four-wheeled vehicles.

Dated 1st July, 1862.

2050. W. Gossage, Widnes, Lancashire—An improved method of, and apparatus for, decomposing chloride of sodium and chloride of potassium, for the production of compounds of soda and potassa.

Dated 18th July, 1862.

2058. A. B. Brown, Castle Farm, Stockport—Imp. in steam engines and boilers.

Dated 19th July, 1862.

2092. J. J. Halsey, 7, King-street, Cheapside—An improved machine for wringing clothing and other woven fabrics. (Partly a com.)

Dated 22nd July, 1862.

2096. Major Vignon, R.E., 20, Southampton-buildings, Chancery-lane—Imp. in the means and apparatus for extinguishing fires either on land or water. (Partly a com.)

Dated 23rd July, 1862.

2112. J. Anderson, Allan Bank, near Braco—Imp. in separating gluten from starch, and in preparing gluten for food.

2114. W. Clark, 53, Chancery-lane—An improved apparatus for decanting wine. (A com.)

2118. E. Comfort, Richmond-terrace, Grosvenor-park, Camberwell—Imp. in watch protectors.

2120. E. Tysall, Riding House-street, Portland-place—An improved manufacture of fork.

Dated 25th July, 1862.

2122. A. V. Newton, 66, Chancery-lane—An improved mode of attaching armour plates to ships. (A com.)

2124. Captain J. Henry Selwyn, R.N., Woodland Craig, Grassmere, Westmoreland—Imp. in apparatus employed in paying out and raising electric telegraph cables.

2126. R. Low and W. Duff, Dundee—Imp. in apparatus, or means, for producing an adjustable pressure on certain parts of machinery.

Dated 26th July, 1862.

2128. H. Bollinger, Stockton-on-Tees—Imp. in machines employed in ship building, part of which are also applicable to other purposes.

2136. A. Noble, Bristol—Imp. in obtaining and treating compounds of alumina.

2138. J. Ellis, Witham, Kingston-upon-Hull—Imp. in apparatus for washing corn and other grain.

2140. H. Hedgeley, Great College-street, Camden-town—Imp. in lamps.

Dated 28th July, 1862.

2148. E. T. Hughes, 123, Chancery-lane—An improved process of refining the slag from blast, puddling and other furnaces, and the employment of the refined material for mortar, stones, slabs, ornaments, and other similar articles. (A com.)

2150. J. Norris, Great Russell-street, Bloomsbury—Imp. in the arrangement or construction of ovens.

Dated 29th July, 1862.

2156. G. Nock, Brierley-hill, Staffordshire—A new or improved safety or moveable self-acting crossing for railways. (A com.)

2158. W. E. Gedge, 11, Wellington-street, Strand—Improved means, or apparatus, for securing the safety of trains moving on railways. (A com.)

2160. B. Bailey, Leicester—Imp. in means or apparatus for cutting chaff and other vegetable matters, which imp. are also applicable to cutting or mowing short or lawn grass.

2164. G. H. Birbeck, 34, Southampton-buildings, Chancery-lane—Imp. in the means or processes employed for preserving timber from decay or destruction. (A com.)

2166. T. Holt and P. L. Stott, Rochdale—An improved composition or compositions for protecting polished surfaces of iron and steel against oxidation, and for renewing and improving the polish of such surfaces.

2168. J. W. Dixon, jun., Sheffield—Imp. in coffee urns.

Dated 30th July, 1862.

2174. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of fluids suitable for burning in lamps, and for other uses. (A com.)

INVENTION WITH COMPLETE SPECIFICATION FILED.

Dated 30th July, 1862.

2161. H. White, Hampstead-road—Imp. in shirt collars.

PATENTS SEALED.

[From Gazette, August 8th, 1862.]

August 7th.

358. J. Brinsmead.

361. J. J. McComb.

364. G. J. Aman.

365. F. Tolhausen.

367. J. Brickhill.

369. A. Hinshaw.

370. R. A. Brooman.

371. J. S. Joseph.

372. T. Spencer.

373. A. Samuelson.

376. J. S. Joseph.

379. W. Williams.

383. C. D. Abel.

390. E. E. Allen.

392. E. Green and J. Newman.

399. T. D. McFarlane.

408. C. Turner and J. Shaw.

August 7th.

417. J. Russell.

420. J. Hodgkinson and D. Greenhalgh.

423. E. T. Hughes.

424. T. Birdsall.

440. W. B. Adams.

451. E. M. Stoebr.

461. H. Ward.

474. J. Millington.

491. W. Clark.

499. J. Carnaby.

595. J. Sidebottom.

624. S. S. Bromhead.

745. M. A. F. Mennons.

904. W. M. Cranston.

1650. L. Chaubart.

1712. G. Haseltine.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, August 12th, 1862.]

4th August.

1892. J. Sidebottom.

8th August.

1836. J. Cannon.

1849. W. Muir.

1184. E. Stone.

9th August.

1858. W. Bouch.

1878. C. Mather.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, August 12th, 1862.]

6th August.

1774. J. Macintosh.

7th August.

1830. E. Topham.

9th August.

1854. F. May.

Journal of the Society of Arts.

FRIDAY, AUGUST 22, 1862.

INTERNATIONAL EXHIBITION OF 1862.

GUARANTEE.

The Council beg to announce that the Guarantee Deed is still lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate of £452,300, have been attached to the Deed.

SEASON TICKETS.

Season Tickets may be obtained at the Society's House, on application to Mr. S. T. Davenport, Financial Officer. The prices of the tickets are as follows:—£2 10s., admitting to the International Exhibition and the Gardens of the Royal Horticultural Society every day during the remainder of the season; £1 10s., admitting to the Exhibition only, every day; and 10s., admitting to the Exhibition on shilling days only.

The delivery of the Medals and Certificates of Honourable Mention to the Exhibitors cannot take place till after the close of the Exhibition, when it will be made at a public ceremony in the building, to which will be admitted the holders of all classes of season tickets (except those for shilling days), and the public on payment of £1 each.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s.; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

It is intended to publish the Reports during the present month.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

AWARDS OF MERIT.

The following circular has been issued; a copy will be furnished to any exhibitor on application to the Secretary of the Society of Arts.

Society for the Encouragement of Arts, Manufactures,
and Commerce,
John-st., Adelphi, London, W.C., Aug. 1862.

SIR,—The Council of the Society of Arts have decided to invite the opinion of the Jurors, the Commissioners for the Colonies and for Foreign Countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and I am directed by the Council of the Society of Arts to transmit to you the accompanying Queries, with a request that you will favour them with your views on the subject, it being the intention of the Council to embody the answers they may receive in a public Report:—

- 1.—Are you of opinion that Awards for Merit, by Medals or otherwise, in International Exhibitions, are desirable?
- 2.—State the reasons for your opinion.
- 3.—Ought Works of Fine Art and Designs to be excluded from the Awards?
- 4.—Can you suggest any better method than the appointment of Jurors for making the Awards?
- 5.—Can you suggest any improvement in the Constitution or proceedings of the Juries?
- 6.—Is any Appeal from the decision of Juries desirable?
- 7.—If you think Awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?
- 8.—Have you any further suggestions to offer on the subject?

It is particularly requested that any replies with which you may favour the Council may be sent not later than the 15th of September, and that they may be written on foolscap paper, on one side only, with an inch margin, and numbered corresponding to the number of the questions.

I am, Sir,
Your obedient Servant,
P. LE NEVE FOSTER,
Secretary.

NOTICE TO INSTITUTIONS.

The Programme of Examinations for 1863 is now ready, and two copies have been sent to each Institution in Union and Local Board. Additional copies may be had gratis on application to the Secretary.

The Papers set at the last Examination are now published in the form of a pamphlet, which may be had of Messrs. Bell and Daldy, Fleet-street. Price Sixpence.

Those Secretaries of Institutions who have not already forwarded to the Secretary of the Society of Arts copies of their last Annual Reports, are requested to do so.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October.

PROGRAMME OF EXAMINATIONS FOR 1863.

PRELIMINARY NOTICE.

I. Any person, male or female, not under sixteen years of age, may undergo the Examinations described in the following Programme. They were established to encourage, test, attest, and reward efforts made for self-improvement by adult members and students of the Mechanics' Institutions, Athenæums, People's Colleges, Village Classes, and other Educational Bodies of the like character, in Union with the Society of Arts. Such members and students are commonly mechanics, artisans, labourers, clerks, tradesmen and farmers not in a large way of business, apprentices, sons and daughters of tradesmen and farmers, assistants in shops, and others of various occupations, who are not Graduates, Undergraduates, or Students of a University, nor following nor intending to follow a learned profession, nor enjoying nor having enjoyed a liberal education. To all such members and students, and also to persons of the like condition in places where there are no Institutions able to enter into the Union, the Examinations, Certificates, and Prizes (see page 618) are offered by the Society of Arts. See paragraph 1 (*A. B. C.*), next page.

II. Teachers and Pupil Teachers may be examined and receive Certificates, but cannot compete for Prizes.

III. Persons of a different grade in society, though their admission to the Examinations with the view of obtaining Certificates is provided for, cannot compete for Prizes. See paragraph 1 (*D.*).

LIST OF SUBJECTS AND EXAMINERS FOR 1863.

* * Candidates, before choosing their subjects, should refer to the Time-table, at page 614.

1. Arithmetic	{ Rev. Alexander Wilson, M.A., National Society, London.	14. Animal Physiology (in relation to Health) {	John Marshall, Esq., F.R.S., F.R.C.S., Surgeon to the University College Hospital, and Lecturer on Anatomy in the Government Department of Science and Art.
2. Book-keeping	{ John Ball, Esq., of the firm of Messrs. Quilter and Ball.	15. Botany	{ Dr. Lindley, F.R.S., Profes- sor of Botany in the Univer- sity of London, and Hon. Sec. of the Royal Horticul- tural Society.
3. Algebra	{ J. J. Sylvester, Esq., M.A., F.R.S., Professor of Mathe- matics at the Royal Military Academy, Woolwich.	16. Agriculture	{ J. C. Morton, Esq.
4. Geometry	{ Rev. B. Morgan Cowie, M.A., Professor of Geometry at Gresham College; one of H.M. Inspectors of Schools.	17. Mining and Metal- lurgy	{ J. Arthur Phillips, Esq., Civil Engineer, Graduate of the Imperial School of Mines of France, &c.
5. Mensuration	{ John Sykes, Esq., M.A., Fel- low of Pembroke College, Cambridge, Assistant-Secretary to the Committee of Privy Council on Education.	18. Political and Social Economy	{ Charles Neate, Esq., M.A., Professor of Political Eco- nomy in the University of Oxford.
6. Trigonometry	{ Rev. T. G. Hall, Professor of Mathematics in King's Col- lege, London.	19. Domestic Economy...	{ The Very Rev. Richard Dawes, F.R.S., Dean of Hereford.
7. Conic Sections	{ Rev. Bartholomew Price, M.A., F.R.S., Siedleian Profes- sor of Natural Philosophy in the University of Oxford.	20. Geography	{ Wm. Hughes, Esq., F.R.G.S., Professor of Geography in Queen's College, London.
8. Navigation and Nauti- cal Astronomy...	{ John Riddle, Esq., F.R.A.S., Head Master of the Nautical Schools, Greenwich.	21. English History	{ C. H. Pearson, Esq., M.A., Professor of Modern History, King's College, London.
9. Principles of Mecha- nics	{ Rev. Jonathan Bates, M.A., Fellow of Gonville and Caius College, Cambridge.	22. English Literature...	{ Rev. Samuel Clark, M.A., F.R.G.S., Principal of the Training College, Battersea, <i>Chairman of the Board.</i>
10. Practical Mechanics..	{ T. M. Goodeve, Esq., Profes- sor of Mechanics at the Royal Military Academy, Woolwich.	23. Logic and Mental Science	{ The Right Rev. Wm. Thom- son, D.D., Lord Bishop of Gloucester and Bristol.
11. Electricity, Magnet- ism, and Heat ...	{ Charles Brooke, Esq., M.A., F.R.S., Surgeon to the West- minster Hospital.	24. Latin and Roman History	{ Rev. F. Temple, D.D., Head Master of Rugby School.
12. Astronomy	{ James Glaisher, Esq., F.R.S., Royal Observatory, Green- wich.	25. French	{ Alphonse Mariette, Esq., M.A., Professor of French, King's College, London.
13. Chemistry	{ A. W. Williamson, Esq., Pro- fessor of Chemistry, Univer- sity College, London.	26. German	{ Dr. Bernays, Professor of German, King's College, London.
		27. Freehand Drawing ...	{ F. S. Cary, Esq.
		28. Geometrical Drawing {	Thomas Bradley, Esq., Pro- fessor of Geometrical Drawing in King's College, London.
		29. Theory of Music.....	{ John Hullah, Esq.

TERMS OF ADMISSION TO THE EXAMINATIONS.

1. Every Candidate for Examination must be admitted through a Local Educational Board connected with the Society of Arts, and be at least sixteen years of age.

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|--|------------|
| (A.) Members of, or students of classes in, Institutions in direct Union with the Society of Arts, are admitted | } Free. |
| (B.) Members of, or students of classes in, "Small Institutions"* not in direct Union with the Society of Arts, but connected with a Provincial Union that is "in Union" with the Society, are admitted on payment of a fee of | |
| (C.) In districts where there are no Institutions at all, or only "small Institutions,"* Local Educational Boards, paying one guinea a year to the Society of Arts, may admit candidates on payment of a fee of | } 2s. 6d. |
| (D.) Persons of a higher class of society than those described in paragraph 1 (Preliminary Notice), are admitted to the Examinations on payment of a fee of | |
| | } 10s. 6d. |

N.B.—The Council in every case leave it to the Local Board to decide whether a candidate should pay this fee.

2. Candidates coming under the head (D), as well as Teachers and Pupil Teachers, though they may be examined and receive certificates, cannot compete for the prizes of which details are given at page 618.

3. In any locality, whether there be an Institution in union with the Society of Arts or not, the first thing to be done to enable any person to take advantage of the Society's Examinations, is to form a Local Educational Board.

LOCAL EDUCATIONAL BOARDS.†

4. The Managers of Institutions in Union with the Society of Arts, and other persons desirous to co-operate with the Society in promoting the instruction of adults, are invited to form Local Boards. Each Local Board must consist of at least three members; and, with advantage, may be much more numerous. There must be a Chairman and a Secretary. The district for which the Board is to act should be defined; and every Educational Institution‡ within those limits ought to be represented in the Board. It is of importance that each Local Board should include the representatives of more Institutions than one, and that there should not be more than one Local Board in each locality. The composition of the Board must be such as to command the respect and confidence of the neighbourhood. Where gentlemen of high literary and scientific attainments are willing to serve on the Board, their services are of great value; but the necessary work may be done by any well-educated persons of high character and good sense. No member of a Local Board can be a candidate for examination.

5. A detailed list of the chairman, secretary, and other members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1863. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Whenever this is the case, the names and addresses of the members, both of

District Board and of its Branch Boards must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

6. Local Educational Boards in connection with the Society of Arts need make no payment to the Society, unless they desire to exercise the power of admitting candidates (see par. 1 C.) where there are no Institutions in union with the Society of Arts; in which case a subscription of one guinea a year must be paid.

7. The Society's system of Examinations consists of (1) Previous Examinations by the Local Boards, and (2) Final Examinations by the Examiners of the Society of Arts, under the supervision of the Local Boards.

8. *A Central Committee of Educational Unions and Adult Education Societies, in connexion with the Society of Arts, has been formed to promote uniformity of action and a fixed Standard in the Elementary and Previous Examinations which are held by the Provincial Unions, Adult Education Societies, and Local Boards connected with the Society of Arts. See present vol. of *Journal*, page 539.

PREVIOUS EXAMINATIONS BY THE LOCAL BOARDS.

9. These Examinations are (1) to test the handwriting and spelling of the Candidates, their knowledge of English Grammar, composition, and the common rules of arithmetic, and (2) to ascertain whether their knowledge of those special subjects in which they seek to be examined by the Society's Examiners is such as to offer a fair prospect of their obtaining certificates. The previous Examinations may be either wholly written, or partly oral and partly written, at the discretion of each Local Board.

10. HANDWRITING.—A bold, even, round hand, without loops, long tails, or flourishes, should be preferred.

11. SPELLING, ENGLISH GRAMMAR, AND COMPOSITION.—An extract from some standard English author should be set, into which a few errors of spelling, grammar, and punctuation should be introduced. Some faulty grammatical constructions in common use, and vulgarisms, should be submitted for correction.

12. ARITHMETIC.—A knowledge of the elementary rules, including the Rule of Three, should be required.

13. No candidate can be admitted to the Final Examination without a certificate (see Form No. 4 in Appendix) from his Local Board, that he has satisfactorily "passed" its previous Examination in the elementary subjects specified in paragraphs 10, 11, and 12, and in the special subjects in which he wishes to be examined by the Society's Examiners. If, in any case, a Local Board should be unable itself to examine a Candidate in a special subject, it will be sufficient if that Board notify the fact in the Form No. 4, and add therein that the Board believes the Candidate to be fit to be examined in that subject by the Central Board. N.B.—This relaxation does not apply to music. [See page 359, respecting Central Committee.]

14. The previous Examinations must be held by the Local Boards sufficiently early in the year 1863 to allow the results to be communicated to the Council, on a Form which will be furnished on application (see Form No. 2 in Appendix), on or before the 1st April, when the required number of copies of Form No. 4 will be forwarded to each Local Board. These should be filled up and returned by the 7th April, *i.e.*, four weeks before the commencement of the Final Examinations.

15. Unreserved communications between the Society and the Local Boards will be requisite to secure to the "passes" of the various Local Boards throughout the Union such an uniformity of value as may be attainable.

FINAL EXAMINATION BY THE SOCIETY'S EXAMINERS.

16. The Forms (see Form No. 4, in Appendix, containing the names of the "passed" candidates, and the subjects in which they desire to be examined, having

* Small Institutions are defined as those which have an income of less than £75 a year.

† For a list of the Boards already formed, with the names of the Secretaries, see page 619.

‡ These Educational Boards, besides superintending the Examinations of the Society of Arts, may advantageously assist in promoting various other plans for the furtherance of Education in their districts; it is, therefore, desirable that they should include representatives not only from the various Institutions for the promotion of adult instruction, but also from the principal schools in the locality.

been returned to the Secretary of the Society of Arts, by the 7th April, 1863, the printed papers of questions in the various subjects will be prepared by the Society's Examiners, and will be forwarded to the Secretaries of the Local Boards.

17. The whole of the papers appointed for each of the evenings of the Examination, according to the subjoined Time-table, with the required number of Forms of Declaration (Form No. 8), will be contained in a separate sealed envelope, which is not to be opened till the Candidates are present, at half-past six on that evening.

18. The details of the mode in which the Final Examinations are to be conducted, are given in the "Letter of Instructions," (see Form No. 6, in Appendix), and every member of each Local Board should make himself thoroughly acquainted with them.

19. The Final Examinations must be held *simultaneously on the days and at the hours specified in the following Time-table*, at those places where Local Boards are established.

20. In choosing the subjects in which they desire to be examined, candidates must take notice of the arrangements of this Time-table, as they *cannot* be examined in *two* subjects which are set down for the same evening.

TIME TABLE FOR 1863.

No Candidate may work more than one paper on each evening, and each paper must be worked on the particular evening appointed for it.

Tuesday, the 5th May, From 6.30 to 9.30 p.m.	Wednesday the 6th May, From 6.30 to 9.30 p.m.	Thursday, the 7th May, From 6.30 to 9.30 p.m.	Friday, the 8th May, From 6.30 to 9.30 p.m.
Arithmetic. Trigonometry. Magnetism, Elec- tricity, and Heat. Agriculture. Mining and Me- tallurgy. Geometrical Drawing. German.	Book-keeping. Navigation and Nautical As- tronomy. Conic Sections. Chemistry. Music. Domestic Eco- nomy. English History.	Algebra. Practical Me- chanics. Astronomy. Animal Physio- logy. Political and So- cial Economy. French. *English Litera- ture.	Geometry. Mensuration. Principles of Mechanics. Botany. Geography. Latin. Logic and Men- tal Science. Freehand Draw- ing.

* Two Papers of one hour and a half each in this subject are con- sidered as one.

21. The Local Boards must see, and certify to the Council, in the form which the Council will furnish (see Appendix, Form No. 8), that the papers are fairly worked by each candidate, without copying from any other, and without books or other assistance; and must seal up and return the worked papers to the Council *immediately* on the close of each evening's Examination. The papers will then be submitted to the judgment of the Examiners, and certificates of three grades will be awarded.

22. The names of the candidates who obtain Prizes and Certificates will be published in the *Journal of the Society of Arts*, as soon as the Examiners have pronounced their judgment, and the Prizes and Certificates will subsequently be forwarded to the Local Boards for distribution.

23. A candidate who has obtained from the Society a certificate of the 1st class in any subject, cannot again be examined in the same subject.

24. A candidate who has obtained a certificate of the 2nd or 3rd class may, on the recommendation of the Local Board, be examined in the same subject, in a subsequent year, without again passing the Previous Examination, but the name must always be returned in the proper form (No. 4 in the Appendix.)

25. A candidate who, having obtained a certificate in any subject, desires to be examined in some other subject, in a subsequent year, may be "passed" by the Local Board, after examination in that subject, without re-examination in the elementary subjects specified in paragraphs 10, 11, 12.

SUBJECTS FOR EXAMINATION FOR 1863.

26. In the following paragraphs will be found a brief outline of the portions of the respective subjects in which the candidates will be examined, and their attention is especially drawn to this part of the programme. Though in most instances the Examiner has set down certain Text-books, in so doing he pronounces no opinion as to their merit. Real knowledge, however or wherever acquired, will be accepted by the Examiners.

I.—ARITHMETIC.

27. Practice—Simple and Compound Proportion—Interest—Discount—Insurance—Vulgar and Decimal Fractions; with the principles of a Decimal Notation in money on the basis of the pound unit.

28. The questions framed from the preceding syllabus will consist mainly of practical problems, and the Examiner will take into account not only the correctness of the answers, but also the excellence of the methods by which they are worked out, and the clearness and neatness of working, which must always be shown.

29. Text Books:—Any of the modern treatises on Arithmetic, such as Hunter's Text Book (*National Society*) Colenso (*Longmans*), or Barnard Smith (*Macmillan*).

II.—BOOK-KEEPING BY DOUBLE ENTRY.

30. Candidates should be prepared to answer questions as to the nature and use of the different books usually kept in a merchant's office. They should be prepared to journalize a series of transactions from a waste book, and, having posted the entries to the ledger, to balance the accounts, to prove the correctness of the postings by a trial-balance, and finally to exhibit an account of profit and loss, and a balance sheet.

31. Candidates should be prepared to draw the usual commercial forms, such as receipts, bills of exchange, promissory notes, invoices, account sales, accounts current, bills of parcels, and to explain the meanings of technical terms used in general business.

32. Text Books:—Book-keeping—Irish School Series, (*Groombridge*.)

Rudimentary Book-keeping, (*Weale's Series*.)

Kelly's Elements of Book-keeping, (*Simpkins and Co.*)

III.—ALGEBRA.

33. Elementary Operations and Fractions. Simple and Quadratic Equations and Problems leading to them. Involution and Evolution. Surds. Arithmetical and Geometrical Series. Combinations and Permutations. Binomial Theorem.

34. Text Books:—Todhunter's Algebra (*Macmillan*); Colenso's Algebra (*Longmans*), Lund's or any other modern treatise on Algebra.

IV.—GEOMETRY.

35. A facility in solving geometrical theorems and problems, deducible from the first six books of Euclid, will be expected on the part of those who desire to obtain certificates of the first or second class.

36. Text Book:—Euclid, Books I., II., III., IV., VI., XI., as far as Prop. 21; Potts' smaller edition (*Parker*).

V.—MENSURATION.

37. The calculation of the areas and circumferences of plane figures bounded by arcs of circles or right lines, and solid contents of cones, cylinders, spheres, &c. Candidates will be expected to be familiar with the different rules for measuring and estimating artificers' work, such as joiners', bricklayers', masons', and plumbers' work, and to be able to prepare estimates of such work from given quantities.

38. Text Books:—Lund's Mensuration, Part III., of his Elements of Geometry and Mensuration. Tate's Mensuration. Young's Treatise on Mensuration (*Simms and McIntyre*).

VI.—TRIGONOMETRY.

39. In Plane Trigonometry, the formulæ for the trigonometrical functions of the sum of two angles, the numerical solution of plane triangles, and the use of logarithmic tables, &c.

40. Spherical Trigonometry, Napier's Rules, Solution of Spherical Triangles.

41. Text Books:—Snowball's Trigonometry (*Macmillan*), Hall's Trigonometry for Schools (*Christian Knowledge Society*), or any of the modern treatises on Algebraical Trigonometry. Mathematical Tables (*Chambers' Series*).

VII.—CONIC SECTIONS.

42. The properties of the three curves treated geometrically; also as deduced from the cone. The principles of projection, orthogonal and central, applied to derive the properties of the Conic Sections from those of the circle.

43. Analytical Conics, including the equations of the straight line, the circle, the three conic sections, and the general equation of the second degree.

44. Text Books:—Puckle's Conic Sections (*Macmillan*), Todhunter's Conic Sections (*Macmillan*). Salmon's Conic Sections (*Longmans*). Drew's Conic Sections (*Macmillan*). Whewell's Conic Sections (*Parker*).

VIII.—NAVIGATION AND NAUTICAL ASTRONOMY.

45. A good knowledge of Plane and Spherical Trigonometry, of the definitions and terms used in Nautical Astronomy, and of the various measurements of time and their mutual conversions will be required, as well as skill in the use of logarithmic tables, and neatness, order, and accuracy in the numerical solutions of problems. The candidate should understand the construction of charts; the nature and laws of circular storms; great circle sailing, &c.; the methods of determining the latitude, longitude, variation of the compass, and error and rate of a chronometer by astronomical observations, with the demonstrations of the formulæ employed; the use of Nautical Astronomical Instruments, &c.

46. Text Books:—The Nautical Almanac, (*Murray*). Riddle's Navigation and Nautical Astronomy, (*Law, Essex-street*).

IX.—PRINCIPLES OF MECHANICS.

47. The properties of matter, solid, fluid, and gaseous.

48. Statics: The composition, resolution, and equilibrium of pressures acting on a material particle; constrained particles; machines; attractions.

49. Dynamics: Gravitation; collision; constrained motions, projectiles; oscillations.

50. Rigid Dynamics: Motion of a rigid body about a point;—of a free rigid body;—of a system of rigid bodies.

51. Hydrostatics: Pressures of fluids; equilibrium of floating bodies; specific gravity; elastic fluids; machines; temperature and heat; steam; evaporation.

52. Hydrodynamics: Motion and resistance of fluids in tubes, &c.; waves and tides.

53. Pneumatics: Mechanical properties of air; the barometer.

54. Text Books:—Todhunter's Statics, or Parkinson's Mechanics. Goodwin's Mathematics. Miller's, Phear's, or Webster's Hydrostatics. Webster's Theory of Fluids. The treatise on this subject in Orr's Circle of the Sciences. Golding Bird's Elements of Natural Philosophy, by C. Brooke, (*Churchill*). Lardner's Handbooks on Natural Philosophy.

X.—PRACTICAL MECHANICS.

55. The Application of the Principles of Mechanism to Simple Machines. The Steam Engine.

56. Text Books:—Lardner on the Steam Engine. Scott Russell on the Steam Engine. Nasmyth's Elements of Mechanism, with remarks on Tools and Machinery, (*Weale*). Goodeve's Elements of Mechanism, (*Longmans*).

XI.—MAGNETISM, ELECTRICITY, AND HEAT.

57. Construction and Properties of Magnets; Magnetic Instruments; Terrestrial Magnetism; Diamagnetism.

58. Statical or Franklinic Electricity; Voltaic Electricity; Electro-dynamics; Electro-telegraphy; Electrometallurgy; Thermo-Electricity; Organic Electricity.

59. Conduction, Convection, and Radiation of Heat; Instruments for measuring Heat; Specific and Latent Heat; Reflection and Refraction of Heat; Diathermancy.

60. Text Books:—Golding Bird's Elements of Natural Philosophy, by C. Brooke, (*Churchill*).

Lardner's Handbooks of Natural Philosophy, (*Walton and Maberley*).

Herschel's Discourse on the Study of Natural Philosophy (*Longmans*) for a general view of the subjects.

XII.—ASTRONOMY.

61. The Principles of Plane Astronomy.

62. Text Books:—Herschel's Astronomy, (*Longmans*). First chapters.

Airy's Lectures on Astronomy.

Maddy's Elements of Astronomy.

Practical Astronomy, (Orr's Circle of the Sciences).

XIII.—CHEMISTRY.

63.—Inorganic. Chemistry of the metalloids and metals, laws of combining proportions, volumes of gases, vapours, &c.

Organic. Compositions, properties, and decompositions of alcohols, acids, &c.

64. Candidates are expected to be able to explain decompositions by the use of symbols. Questions illustrative of general principles will be selected from the following, amongst other trades and manufactures: Metallurgy of Lead, Iron, and Copper; Bleaching, Dyeing, Soap-boiling, Tanning; the manufacture of Coal-Gas, Sulphuric Acid, &c.

65. Text Books:—Fownes' Manual of Elementary Chemistry. Miller's Elements of Chemistry.

XIV.—ANIMAL PHYSIOLOGY, IN RELATION TO HEALTH.

66. The general principles of Animal Physiology, and the application of them to the preservation of health and to the wants and emergencies of daily life.

67. Text Books:—Carpenter's Animal Physiology, 1859, (*Bohn*).

Lardner's Animal Physics, (*Walton and Maberley*).

Translation of Milne Edward's Manual of Zoology, (*Renshaw*).

Marshall's Description of the Human Body, with Atlas (*Day and Sons*), for details of Anatomy.

XV.—BOTANY.

68. Sect. I. Vegetable Physiology. The general Structure of a Plant. The manner in which the organs perform their several functions; and the influence exercised by external agents. The nature of their principal tissues. The application of such facts to practical purposes.

69. Text Books:—Lindley's Theory and practice of Horticulture (*Longmans*); or the same author's School-Botany, the edition of 1854, or any later one. (*Bradbury and Evans*).

70. Sect. II. Practical Botany. The meaning of Botanical Terms. The general facts relating to Botanical Classification, excluding that of Linnæus. The Distinctions of some of the principal English Natural Orders of Plants not Cryptogamic. Naming Plants not Cryptogamic at sight. The art of describing Plants correctly. (For this living specimens will be provided.)

71. Text Books:—Lindley's School Botany, and Descriptive Botany, (*Bradbury and Evans.*)

72. Candidates will be expected to return four correct answers to questions in Sect. I., and eight in Section II.; each Botanical description standing for one answer. The questions in both sections will have reference exclusively to subjects having some practical application. No one can pass who is not able to answer fairly the questions in Section II., proficiency in which will be rated higher than in Section I. Students are earnestly recommended to practice as much as possible the art of describing plants correctly, and precisely in the manner required by the great Linneus, whose method is fully explained in "Descriptive Botany," now forming a part of "School Botany." They should also apply themselves diligently to the study of the wild or common hardy garden plants to which they may have access. A knowledge of Field Botany will rank much higher with the Examiner than mere Botany picked up in books.

XVI.—AGRICULTURE.

73. Half-a-dozen questions will be put on the theory and practice of each of the following departments of Agriculture:—(1) The tillage and manuring of the soil; (2) The cultivation of plants; (3) Live-stock management and the meat-manufacture. A certificate will be easily obtained by any one able to direct the labour of the farm, who has also read any of the following standard Agricultural works:—

74. Morton's Cyclopaedia of Agriculture, (*Blackie.*) Stephen's Book of the Farm, (*Blackwoods.*) Johnstone's Agricultural Chemistry, (*Blackwoods.*) Low's Elements of Practical Agriculture, (*Longmans.*)

XVII.—MINING AND METALLURGY.

75. Candidates should be able to identify with facility the ores of the more common metals, and be acquainted with their chemical compositions. They should also be familiar with the forms of occurrence of the various metallic ores, and the usual methods employed for their extraction and subsequent purification by crushing, stamping, and washing, &c. Underground surveying, principles of ventilation, particularly as applicable to collieries. A knowledge of furnace assaying, and a general acquaintance with the metallurgy of the more important metals.

76. First-class certificates can be given to those only who have either acquired some practical knowledge of mining, or who possess a special acquaintance with the metallurgy of at least one of the useful metals.

77. Text Books:—Dana's Mineralogy (*Trübner and Co.*, Paternoster-row.) Mitchell's Assaying, (*Baillière.*) Manual of Metallurgy, (*Grijin.*) Useful metals and their Alloys, (*Houlston and Wright.*) Ure's Dictionary of Arts, Manufactures, and Mines, (*Longmans.*) Percy's Metallurgy, (*Longmans.*) Metallurgy of Iron, Truran, (*Spon.*)

XVIII.—POLITICAL AND SOCIAL ECONOMY.

78. Text Books:—Jones's Lectures on Political Economy, edited by Whewell. Principles of Political Economy, by John Stuart Mill.

79. Some knowledge of the Commercial, Financial, and Statistical History of the United Kingdom will be required, for which "Porter's Progress of the Nation," "McCulloch's Commercial Dictionary," and "Merivale's Lectures on Colonisation and the Colonies" (new edition) may be consulted.

N.B.—The Principles of Political Economy, by John Stuart Mill, need be studied only by those who aspire to a first class certificate.

XIX.—DOMESTIC ECONOMY.

80. By this is meant a knowledge of the management of household matters, and the principles on which they are conducted; the "why and the wherefore" of everything

under this head. For instance, as regards food, animal and vegetable, how differing in nutriment, &c., cookery, &c.

81. Clothing of various kinds, how best fitted for varying climates, seasons, and occupations, &c.

82. The Sanitary regulations of the house, such as ventilation, warming and lighting, drainage, &c. A knowledge of the weights and measures by which the prices of provisions, &c., are regulated; in fact, how to make the most of a small income.

83. A knowledge also of the principles of the Savings Bank, and of the accumulation of small savings, of the Benefit Society, of present and deferred annuities.

84. Text Books:—A Manual of Domestic Economy, by Tegetmeier, (*Home and Colonial School Society.*)

Household Economy, by Margaret Brewster, (*Constable and Co.*)

Domestic Economy, by Esther Copley, (*Groombridge and Son.*)

XX.—GEOGRAPHY.

85. All candidates will be expected to possess a sound knowledge of Elementary Geography, both physical and descriptive. Such knowledge will of necessity embrace an acquaintance with at least the outlines of the great natural features of the globe, the political divisions of countries, and the localities of towns and other places of importance. This kind of knowledge will be looked for in fuller extent with regard to the British Islands, and the various portions of the British Empire, than in respect of other countries. Among the tests applied to it, will be the making, from memory, a sketch showing the chief features of any particular country in Europe named by the Examiner, and also the sketching a Map of some portion of the British Islands (either the county in which the candidate may be resident, or any particular district that may be preferred by himself). It will not of course be expected that such sketches should possess accuracy of detail, but they should at least show the general direction of coast-lines, mountain-chains, or river-courses, with the localities and names of the principal towns. The map of a part of Britain should embody the chief natural features which the district may include (with the situation of coal-fields, if any), and should have marked upon it localities which are distinguished as seats of manufacturing or commercial industry.

86. In addition to the above, candidates who aim at the highest class of certificate should be prepared to answer questions bearing upon Geography in its relation to the Physical Sciences and the History of Mankind—such questions, that is, as involve a general acquaintance with the subject of Climate, the laws of Meteorology, the Distribution of Plants and Animals over the Globe, the leading outlines of Geology, the Ethnographic Division of the Human race, and the commercial resources of different lands. This kind of knowledge is looked for, not in place of geographical knowledge of a more elementary kind, but as supplementary to the latter, and throughout based upon it.

87. Text Books:—

Manual of Geography, by William Hughes, (*Longmans.*) Guyot's Earth and Man, (*Parker and Son.*)

Physical Geography, by Sir John F. W. Herschel, (*A. and C. Black.*)

Physical Geography of the Sea, by Maury, (*Philip & Son.*)

Page's Introductory Text Book of Geology, (*Blackwood.*)

The General Atlas (*published by the National Society.*)

The School Physical Atlas (*either Johnstone's or that published by the National Society.*)

XXI.—ENGLISH HISTORY.

88. English History and English Constitutional History.

Text Books:—The Student's Hume. Creasy's Rise and Progress of the English Constitution.

89. Special subject :—The Revolt of the American Colonies.

Text Book :—The chapters relating to this subject in Lord Mahon's History of England.

XXII.—ENGLISH LITERATURE.

90. Any two, but not more than two, of the authors in the following list may be taken up for examination :—

Chaucer.—The Knight's Tale.

Shakspeare.—Macbeth ; Julius Cæsar ; As you like it.

Milton.—Paradise Lost, Books I. to VI.

Pope.—Essay on Man—Essay on Criticism—Rape of the Lock.

Addison, &c.—Spectator Vol. VIII.

Tennyson—Idylls of the King and In Memoriam.

Angus—Handbook of the English Tongue, chapter I. to chapter IV.

91. Candidates are recommended to make a very careful study of the text of the authors they may select. The questions on each author will be divided into two sections, the first intended to test the candidate's acquaintance with the text, the second his knowledge of the subject-matter and his critical and literary information. Full marks will not be given for answers in the second section, if those in the first section do not prove satisfactory.

XXIII.—LOGIC AND MENTAL SCIENCE.

92. Logic: Candidates will be expected to answer questions on the different processes of thought, and on the connexion of thought and language. Every Candidate must attempt to analyse examples of reasoning, and to detect fallacies.

93. Text Books :—Whateley's Elements of Logic, or Thomson's Outline of the Laws of Thought.

94. A Candidate for a second or third-class Certificate will be expected to prepare, in addition, any one of the following books which he may select :—Bacon's Novum Organum, Book I. (English Translation); Bishop Butler's Sermons; Paley's Moral Philosophy; Dugald Stewart's Philosophy of the Human Mind, Volume I.

95. A Candidate for a first-class Certificate will be expected to prepare any two of these works which he may select.

XXIV.—LATIN AND ROMAN HISTORY.

96. Livy, Book viii.

Virgil. Æneid, Book v.

Roman History to the death of Augustus Cæsar.

97. Text Book :—Liddell's History of Rome, in one volume.

XXV.—FRENCH.

98. The Examination paper will be divided into three parts.

99. The first will comprise grammatical questions and an extract from a modern French writer to be translated into English. Candidates aiming at a 3rd class certificate should confine themselves to this first part.

100. The second part will comprise an English extract to be translated into French, and a list of idiomatic expressions to be rendered from French into English, or *vice versa*. This should be done satisfactorily by the candidate who aims at a 2nd class certificate.

101.—In the third part, candidates for a 1st class certificate will have, in addition to a portion of the above, to answer properly (*in French*) some elementary questions on the two following subjects :—

1. French literature in the second half of the 17th century, comprising the great writers who were born between the years 1620 and 1640 (from Molière to Racine).

2. The History of France, from the death of Cardinal Richelieu to the Revocation of the Edict of Nantes (1642 to 1685).

102. Books recommended :—Nisard: Histoire de la Littérature Française, (*Williams and Norgate*, London and Edinbro'). Duruy: Histoire de France, (*Williams and Norgate*.)

XXVI.—GERMAN.

103. Schiller's Geschichte des Abfalls der Niederlande.

Schiller's Wallensteins's Tod.

Goethe's Egmont.

Kohlrausch's Deutsche Geschichte.

104. Pieces from each of the above works will be given for translation, at the choice of the candidate. Every candidate must translate one piece. First-class certificates will be given to those only who translate *well* from English into German, and write in German a well-expressed Essay on a subject which will be announced to them when they come up for examination.

XXVII.—FREEHAND DRAWING.

105. In freehand drawing the Candidate will be required to show a practical knowledge of the principles usually applied to the imitation of natural and artificial forms, such as furniture, manufactured articles, ornament, foliage, and the human form.

XXVIII.—GEOMETRICAL DRAWING.

106. Practical Geometry, or Geometrical Drawing, required by the Mechanist, Engineer, Builder, and all in any way employed in the arts of construction. The Candidate will be examined in Practical Plane Geometry, the construction of right line figures of given areas, and of curve lines required in the arts, &c.; in Practical Solid Geometry, Elementary Problems on the line and plane, and their combinations, the representation by orthographic projection of simple solids from conditions, and in the principles of Development as used in the construction of Maps, &c.; and in Elementary Perspective Projection as far as it is required by the Architect.

107. Text-books :—Geometry, Plane, Solid, and Spherical (*Library of Useful Knowledge*) is especially recommended as a work to be studied on Theoretical Geometry. —Elements of Geometrical Drawing, published for the Committee of Council on Education, 2 parts, (*Chapman and Hall*). —Hall's Elements of Descriptive Geometry for Students in Engineering. Heather's Descriptive Geometry. Also the following French Works, which are mentioned in consequence of the great deficiency of English Works on Geometrical Drawing :—Eléments de Géométrie Descriptive, par S. F. Lacroix; Traité de Géométrie Descriptive, par Lefebure de Fourcy; Nouveau Cours raisonné de Dessin Industriel, par Armengaud, aîné, et Armengaud, jeune, et Amoureux; Bardin's Works on Descriptive Geometry.

XXIX.—THEORY OF MUSIC.

108. Notation, the modern modes, intervals, time signatures, the stave, transposition, modulation, terms and characters in common use.

109. The Elements of Harmony.

110. Musical History and Biography.

111. Arrangements must be made, in the Previous Examination by the Local Boards, to test Candidates, by oral examination, in their knowledge or appreciation of the sound of musical successions and combinations. A form of the test to be used for this purpose by the Local Board at the Previous Examination will be sent by the Council to such Local Boards as may *apply for it*, in due time before the Examination.

P R I Z E S F O R 1 8 6 3 .

THE PRINCE CONSORT'S PRIZE.

112. His Royal Highness the late President of the Society was pleased to offer annually to the candidate who, obtaining a certificate of the first class in the current year, shall have obtained in that year and the three years immediately preceding it, the greatest number of such certificates, a Prize of TWENTY-FIVE GUINEAS, and this Prize Her Majesty the Queen has graciously intimated her intention to continue. This Prize cannot be taken more than once by the same candidate. It will be accompanied by a certificate from the Society of Arts, setting forth the special character of the Prize, and the various certificates for which it was granted.

G E N E R A L P R I Z E S .

* * * No Prize in any subject will be awarded to a Candidate who does not obtain a Certificate of the first-class therein.

1. Arithmetic	{ First Prize, £5. Second Prize, £3.	17. Mining and Metal- lurgy	{ First Prize, £5. Second Prize, £3. Additional by Gift of Sir Thomas Phillips, F.G.S.:— Third Prize, £2, and Three Prizes of Books, value £1 each.
2. Book-keeping	{ First Prize, £5. Second Prize, £3.	18. Political and Social Economy.....	{ First Prize, £5. Second Prize, £3.
3. Algebra	{ First Prize, £5. Second Prize, £3.	19. Domestic Economy...	{ First Prize, £5. Second Prize, £3.
4. Geometry	{ First Prize, £5. Second Prize, £3.	20. Geography	{ First Prize, £5. Second Prize, £3.
5. Mensuration	{ First Prize, £5. Second Prize, £3.		
6. Trigonometry	{ First Prize, £5. Second Prize, £3.		
7. Conic Sections.....	{ First Prize, £5. Second Prize, £3.	21. English History	{ First Prize, £5. Second Prize, £3. Additional by Gift of Sir C. Wentworth Dilke, Bart.:— Third Prize, £2; and Three Prizes of Books, value £1 each.
8. Navigation and Nauti- cal Astronomy ...	{ First Prize, £5. Second Prize, £3.		
9. Principles of Mecha- nics	{ First Prize, £5. Second Prize, £3.	22. English Literature ...	{ First Prize, £5. Second Prize, £3. Additional by Gift of Sir C. Wentworth Dilke, Bart.:— Third Prize £2; and Three Prizes of Books, value £1 each.
10. Practical Mechanics.	{ First Prize, £5. Second Prize, £3.		
11. Magnetism, Electri- city, and Heat.....	{ First Prize, £5. Second Prize, £3.	23. Logic and Mental Science	{ First Prize, £5. Second Prize, £3.
12. Astronomy.	{ First Prize, £5. Second Prize, £3.	24. Latin and Roman History	{ First Prize, £5. Second Prize, £3.
13. Chemistry	{ First Prize, £5. Second Prize, £3.	25. French	{ First Prize, £5. Second Prize, £3.
14. Animal Physiology (in relation to Health).	{ First Prize, £5. Second Prize, £3. Additional by Gift of Harry Chester, Esq.:— Third Prize, £2, and Three Prizes of Books, value £1 each.	26. German	{ First Prize, £5. Second Prize, £3.
15. Botany	{ First Prize, £5. Second Prize, £3.	27. Freehand Drawing ...	{ First Prize, £5. Second Prize, £3.
16. Agriculture	{ First Prize, £5. Second Prize, £3. Additional by Gift of J. C. Morton, Esq.:— Third Prize, £2, and Three Prizes of Books, value £1 each.	28. Mechanical Drawing.	{ First Prize, £5. Second Prize, £3.
		29. Theory of Music.	{ First Prize, £5. Second Prize, £3.

LOCAL EDUCATIONAL BOARDS.

The following is a List of the places at which Boards have already been formed, with the names of the Secretaries, from whom intending Candidates may obtain information relative to the Examinations:—

LOCAL BOARDS.	SECRETARIES.		
Aberdeen	Mr. James Sinclair, Mechanics' Institution, Aberdeen.	Glasgow, Institution	Mr. John Craig, F.E.I.S., Glasgow Institution, 37, Cathedral-street, Glasgow.
Airdrie School of Arts, and Mechanics' Institution.	Mr. Boyd M. McCrae, Airdrie.	Glasgow, Mechanics' Institution	Mr. James Thomson, 48, St. Enoch-square, Glasgow.
Aldershot District	Mr. Barrow Rule, M.C.P., Principal of the Classical and Mathematical School, Aldershot.	Glasgow, Popular Evening Classes, Andersonian University	Mr. Robt. B. Smith, Teacher of English and Classics, Andersonian University, 37, Garnethill-street, Glasgow.
Ashford	Mr. F. Garaway, Schoolmaster, Ashford New Town.	Greenwich	Mr. Jas. Spencer, 3, Wintown-place, Greenwich, S.E.
Bacup	Mr. Thos. Newbigging, Bacup.	Halifax, Mechanics' Institution	Mr. A. C. Foster, Solicitor, 1, Westgate, Halifax.
Banbury	Mr. John H. Beale, Banbury.	Halifax, Working Men's College	Mr. Geo. Gibb, Haley Hill, Halifax.
Barnet	Mr. John Thimbleby, Barnet.	Hartlepool (West)	Mr. Thos. Preston Brunton, Solicitor, West Hartlepool.
Belfast	Rev. Wm. Julius McCullagh, Ballysillan, Belfast.	Hertford	Mr. John Marchant, jun., Port-vale, Hertford.
Berkhampstead	Mr. J. R. Crawford, M.A., Master of Grammar School.	Hitchin	Mr. Joseph Pollard, High-down, near Hitchin.
Birmingham and Midland Institute	Mr. Thos. Martineau, Solicitor, Cannon-st., Birmingham.	Holmfirth	Mr. J. Batley, South-lane, Holmfirth.
Bishop's Stortford	Mr. F. Woodham Nash, B.A., Lion House, Birchanger, Bishop's Stortford.	Ingrow-cum-Hainworth	Mr. Jackson, Ingrow-cum-Hainworth.
Blackburn	Mr. J. H. Margerison, Blackburn.	Ipswich	Mr. Herbert Wright, 44, Handford-road, Ipswich.
Blandford	Mr. Jas. B. Green, Architect and Surveyor, Salisbury-street, Blandford.	East Lancashire Union of Mechanics' Institutions, Burnley	Mr. John Sutherland, Post-office, Burnley.
Bradford	Mr. M. H. Walls, 66, Victoria-street, Bradford.	Leeds West Riding Union	Mr. Barnett Blake, Agent of the Yorkshire Union of Mechanics' Institutions.
Brighton (for Sussex)	Mr. Barclay Phillips, 75, Lansdowne-place, Brighton.	Leeds Young Men's Christian Association	Mr. John Pickering, Secretary of the Leeds Mechanics' Institution.
Bristol	Mr. J. F. R. Daniel, Athenæum, Bristol.	Leicester	Mr. Mark Scott, 9, East-parade, Leeds.
Brompton (near Chatham)	Mr. J. Greenleaf, 8, Prospect-row, Brompton, Chatham.	Lichfield	Rev. D. J. Vaughan, St. Martin's Vicarage, Leicester.
Bucks and Berks Adult Education Society, Windsor	Rev. Thomas Rooke, M.A., St. Alban-street, Windsor.	Liverpool	Rev. S. C. Hamerton, Lichfield.
Bury (Lancashire)	Mr. Edward Bunting, Athenæum, Bury.	Lockwood	Rev. A. Hume, D.C.L. and LL.D., 24, Clarence-street, Everton.
Bury St. Edmund's	Mr. John Jackson, Head Master of the Commercial School, Bury.	London Mechanics' Institution	Mr. Alfred Lee, Mechanics' Institution, Lockwood.
Canterbury	Rev. Edward Gilder, M.A., Canterbury.	„ Polytechnic Institution (Limited)	Mr. T. A. Reed, 11, Chancery-lane, W.C.
Carlisle Church of England Association	Mr. Thos. Harris, Stationer, 51, Castle-street, Carlisle.	„ City of London College, Sussex Hall, London, E.C.	Mr. R. G. Hancock, Polytechnic Institution.
Carlisle Mechanics' Institute	Mr. W. A. Williamson, Mechanics' Institute, Carlisle.	„ St. Stephen's, Westminster	Mr. W. H. Hansen, City of London College, Sussex Hall, Leadenhall-street, E.C.
Chelmsford	Mr. Edwin Adams, M.R.C.P., Guildford-ter., Chelmsford.	„ St. Thomas, Charterhouse, Evening Classes	Mr. Samuel Elliott, Emery Hill's School, Rochester-row, Westminster, S.W.
Croydon	Mr. Francis Warren, Bookseller, 131, High-street.	Louth	Rev. R. Holme, 7, Charterhouse-square, E.C.
Darlington	Mr. Geo. S. Gibbs, Haughton-le-Skerne, Darlington.	Lynn (King's)	Mr. Benjamin Crow, Mechanics' Institution, Louth.
Deptford	Mr. Thomas Earland, 2, Wellington-grove, Greenwich-road, S.E.	Macclesfield	Mr. T. Barton, 23, South Everard-street, Lynn.
Derby	Mr. H. M. Holmes, Hon. Local Sec. to the Society of Arts, London-road, Derby.	Manchester	Mr. D. B. Curwen, Park-lane, Macclesfield.
Devonport	Mr. Wm. Mogg and Mr. Samuel Chapple, Mechanics' Institute, Devonport.	Middlesbro'	Mr. Edwin Simpson, Manchester Mechanics' Institution.
Faversham	Mr. Frederick W. Monk, Managing Director of the Faversham Institute.	Newbury	Mr. William Taylor, Mechanics' Institute, Middlesbro'.
Glasgow, Athenæum	Mr. Moses Provan, Accountant, 110, West George-street, Glasgow.	Newcastle - on - Tyne Church of England Institute	Mr. T. Gurney, Newbury.
			Mr. Joseph Forster, St. John's School, Newcastle-on-Tyne.

Newcastle-on-Tyne Mechanics' Institution.....	Mr. Adam Carse, 18, Mosley-street, Newcastle.
Nottingham	Dr. W. Tindall Robertson, Nottingham.
Oldham	Rev. John Hodgson, Queen-street, Oldham.
Paisley	Dr. W. B. McKinlay, Paisley.
Pembroke Dock.....	Mr. Augustus Wiele, H.M. Dockyard, Pembroke Dock.
Peterborough	Mr. C. T. Cotton, Long-causeway, Peterborough.
Poole	Mr. Robert Belben, Accountant, Longfleet, Poole.
Richmond	Rev. W. Bashall, A.M., 3, Cambridge - villas, Richmond-hill, S.W.
Rotherham	Mr. Frederick Edwards, Solicitor, Rotherham.
Salford.....	Mr. M. H. Habershon, Holmes, near Rotherham.
Scarborough	Mr. William Noar, Borough Treasurer, Town Hall, Salford.
Selby	Mr. William Barry and Mr. Thomas Shields, Town Hall, Scarborough.
Sheerness	Mr. William Allison, Bank Manager, Selby.
Sheffield	Mr. Wm. Welch, 1, Cavour-terrace, Alma-road, Marine-town, Sheerness.
Skipton	Mr. T. Rowbotham, People's College, Sheffield.
Southern Counties' Adult Education Society	Mr. George Kendall, Skipton.
South Staffordshire Union of Educational Institutes	Rev. R. Fitzgerald, Winslade, Basingstoke.
Thirsk.....	Mr. J. Jones, The Trindle, Dudley.
Wakefield	Mr. G. Baker, Market-place, Thirsk.
Warminster	Mr. John Masterman, Mechanics' Institution, Wakefield.
Waterford	Mr. Frank Morgan, Warminster.
Wellingborough.....	Mr. James Budd, Thomas-street, Waterford.
Wigan.....	Mr. Thos. S. Curtis, Wellingborough.
Wirksworth	Mr. James Seward, Dieconsion-street, Wigan.
Worcestershire, Union of Educational Institutes	Mr. William Tomlinson, Mechanics' Institute, Wirksworth.
York	Rev. W. Walters, Hanley-grange, Upton-on-Severn.
	Mr. Charles Cumberland, Institute of Popular Science, York.

APPENDIX.

This Appendix, which is attached to the separate copies of the Programme printed for distribution,* contains the forms that will be forwarded at the proper time to the Local Boards, but as these do not differ materially from those of last year, they are not here reprinted in the *Journal*. The Appendix also contains the List of Prizes and Certificates Awarded, and the Tables of the results of last year's Examinations, with the remarks of the Examiners. These have already appeared in the *Journal*, pages 489, 513, 523.

* Copies may be had gratis on application to the Secretary of the Society of Arts.

ASSOCIATION FOR PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

At the last ordinary monthly meeting of the Executive Committee of the Association, held at the offices, 41, Corporation-street, Manchester, on Wednesday, July 30th, William Fairbairn, Esq., C.E., F.R.S., in the chair, Mr. L. E. Fletcher, chief engineer, presented his monthly report, of which the following is an abstract:—

"During the last month there have been examined 323 engines and 563 boilers. Of the latter, two have been examined specially, one internally, 95 thoroughly, and 465 externally, in which the following defects have been found:—Fracture, 16 (2 dangerous); corrosion, 46 (8 dangerous); safety-valves out of order, 11 (1 dangerous); water gauges ditto, 19 (4 dangerous); pressure gauges ditto, 14; feed apparatus ditto, 11; blow-off cocks ditto, 28 (1 dangerous); fusible plugs ditto, 6; furnaces out of shape, 10 (3 dangerous); blistered plates, 7; total, 168 (19 dangerous). Boilers without glass water gauges, 12; without pressure gauges, 2; without blow-off cocks 50; without back pressure valves, 98.

"Three explosions occurring during the past month, to boilers not under the inspection of this Association, have come to my knowledge. One of these took place in Manchester, the other in the neighbourhood of Newcastle, and the third in London, while all three were attended with fatal consequences. The plates of the first are reported as having been found on subsequent investigation so reduced by corrosion, as not to have exceeded the thickness of a sheet of paper; while it is worthy of remark, with regard to the second, that its explosion had seriously damaged another boiler alongside of it, which, however, fortunately happened at the time to be out of work, or from the injuries it received, it must have exploded in turn. This is frequently found to be the case, and the fact is of interest, as affording an indication of the variety of forces developed by explosion, which, as has been previously pointed out, evidently cannot be summed up merely in that of disruption and the reaction consequent on unbalanced pressure.

"In addition to the above, however, it becomes my duty to report the occurrence of an explosion to one of the boilers belonging to a member of this Association, and which, it is to be regretted, was attended with loss of life to the fireman.

"This is the third fatal explosion which has happened to any of the boilers under the inspection of this Association since its establishment, nearly eight years ago, to which should be added three cases of collapse of furnace flues, not attended with any serious consequences, and which arose in two instances, if not in all three, from shortness of water. During this period, 656 dangerous defects have been pointed out in the boilers under inspection, from which serious injury might have arisen in each case; while, upon limited inquiry only, it has been found that no less than 202 fatal explosions have occurred in that time to boilers not under the inspection of this Association, which have been attended with the loss of 438 lives, in addition to serious injury to 476 persons, and considerable damage to property.

"The explosion last referred to occurred to one of a pair of ordinary cylindrical double-flued boilers, working side by side and connected together. Both boilers were upon mid-feathers, and were of precisely similar construction and dimensions, the length of each being 34 feet, the diameter of the shells 7 feet, of the flues 2 feet 7½ inches, and the thickness of plates ¾ths of an inch throughout, with the exception of the flat ends, which were ⅞ths of an inch. The fittings consisted in each case of a glass water-gauge; a back pressure and feed stop-valve combined; a blow-out valve, of mushroom construction, opening against the pressure in the boiler; and a lever safety valve, loaded with a single weight to a pressure of 35 lb. per square inch; in addition to a steam pressure

gauge common to both boilers as long as both junction valves were open, but not otherwise.

"The explosion was occasioned by a rent in the shell, which took place directly through the line of rivets, at one of the longitudinal seams in the second ring of plates from the front of the boiler, the seam being on the right-hand side, three feet from the centre or 'keel' line at the bottom. The construction of the seam was such that the edge of the outer plate was uppermost.

"The cause of the rent was thinning of the plates at this seam, by external corrosion, through which it had become reduced to about $\frac{1}{16}$ th of an inch in thickness. The corrosion extended throughout the length of the seam, which was 2ft. 6in., and affected the plates on both sides of the lap to a width of from four to 6 inches. The rent did not extend longitudinally beyond the limit of this ring of plates, but ran along the transverse seams of rivets on each side of it, almost severing a complete belt from the boiler. The reaction from this opening raised the boiler momentarily almost on end, as was attested by the character of the fracture of the connections, the indentations in the bottom plates, and the fact that a pipe, previously overhead, had become buried beneath it, while the twin boiler along side was blown bodily in a lateral direction. Had the longitudinal seams of the rivets, instead of breaking joint, been in line, which is too frequently the case, the rent would certainly have run from one end of the boiler to the other, and the destruction of property, and very probably that of life also, have been most serious.

"This defect was one that could scarcely have escaped detection on a careful examination of the condition of the plates in the external flues. Still, it should be borne in mind that the plates of boilers set on mid-feathers are neither as accessible nor as visible as they are in those set on two side walls with a split flue. The side flues in the latter case admit of coming face to face with the plates and seams in a manner which cannot be done in the former, in which many of them can only be seen obliquely at a very great disadvantage, while those at the upper part of the flue, in what may be termed the tip of the wing, are frequently out of reach altogether.

"All the members must be aware that, for the express purpose of detecting such defects as the above, the association affords, in addition to the external inspections, the opportunity of having every boiler 'internally and thoroughly' examined at least once a year. The importance of these 'thorough' examinations has been repeatedly called attention to, and every opportunity taken to promote their being made, and, in order to suit the convenience of members as to time, the ordinary routine of visits is entirely set aside at holiday times, such as Whit-week, Christmas, Easter, and race weeks, so that the inspectors may exclusively devote themselves to this special service.

"It is much to be regretted that the Association was not afforded the opportunity of making a 'thorough' examination of this boiler, either in the year 1860 or 1861, and, when in consequence of attention being specially called to this omission, our inspector, at the request of the owners, visited the works last Easter, the boiler was found unprepared, the flues being imperfectly swept, and the plates coated with soot, although the visit had been expressly appointed, in order to effect a 'thorough' examination. Under these circumstances, no satisfactory examination could be made, which was distinctly stated to the engineer at the time, and subsequently officially reported to the owners. So clearly was this understood, that the next time the boiler was stopped the manager of the works went up the flue himself in order to complete the examination, which the want of preparation had previously prevented our inspector from doing.

"It is hoped that our members will see from this the absolute necessity of having their boilers prepared for examination. They certainly cannot fail to remember how constantly this has been pressed upon their attention. A

note referring to it appears at the foot of every notice forwarded to them of the inspector's proposed visit, and another in the report on his examination, while reference was made to the subject in the chief engineer's monthly report for June, sent to each member; and, in addition, attention is frequently called by special letter, as it was in the present instance. Had it not been for its practical importance, so much had not been said upon so uninteresting a subject, and apology has sometimes been felt necessary for its frequent introduction. Still, dry or not dry, it is often a question of explosion or no explosion.

"Yet another word before dismissing this subject. To expect an inspector to wait while the flues are being swept, as is too frequently the case, is really unreasonable, and compliance could only result in the accommodation of one member at the expense of another, while it would induce such disorder and breach of appointments as would only lead to a general dead-lock, especially in such a thronged time as every holiday week is, when the inspectors have one continuous string of engagements for these 'thorough' examinations, from its beginning to its close, many of them being fixed for more than a month previously.

"It may be added that the engineer who lost his life had been in the habit of going up the flues every month after they had been swept, and yet did not detect the corroded seam. This either shows that the corroded plate was concealed from view in some way in which it was impossible to account for after the explosion, or else is a witness to the necessity of competent inspection. That sweeps cannot be trusted to do engineering work is also clear."

Home Correspondence.

RECREATION AT MECHANICS' INSTITUTES.

SIR,—I should like to see in the *Journal* some letters on this subject from other parts of the kingdom. It is beginning to excite attention, and its importance is being appreciated at several Institutes. The managers feel convinced of the necessity of doing something in this direction, and are anxious to obtain as much evidence as possible of the result of the experiments that have been made. Local secretaries should not confine their communications to an occasional copy of an annual report, but, through the columns of the *Journal*, make known their experience, their wants, and also their opinions. By such interchange of information the connection with the Society of Arts would be made practically available for mutual advantage.

During the winter season, when the long evenings render warmth and light, comfortable rooms and social converse, great sources of attraction, there are many ways in which an Institute might provide for the innocent recreation of large numbers, who, for want of such an inducement, are not now brought within its influence. Perhaps the simplest form is convenience for games of skill, such as chess, draughts, &c. At Huddersfield the committee refused to allow these amusements to be continued, because they discovered that some of the young men made bets on the results of the games. This, however, was a very narrow view to take of the question, banishing all the good on account of, perhaps, a minimum of the evil accompanying all human institutions. Wagers might certainly be forbidden, but a breach of the regulation need not involve a forbidding of chess, which requires an active exercise of the mental powers. But, while admitting games of skill, games of chance should not be permitted.

Music, both vocal and instrumental, affords a never-failing source of attraction to both sexes, of all ages, either as performers or listeners. In Leeds the Working Man's Institute finds that a concert, with a charge for admission as low as one penny, will induce the attendance of thousands, with, it is to be hoped, some beneficial effects from

the humanising influence of sweet sounds; and though this may be practicable only where a very large building can be obtained, there are other means of accomplishing the same end. The committee of the Institute should make active exertions to establish classes for the practice of vocal as well as instrumental music. The Tonic Sol Fa system is an excellent method of training many voices to sing in unison, and their rehearsals will give delight to themselves and others. There is no lack of material, and taking sacred music, which is by far the most useful, for its improving effect upon religious services, the pupils might commence with the simplest chants, and continue their labour of love in perfecting their vocal powers until they are able to accomplish the magnificent choruses of Handel.

There are many who take delight in the performance of some musical instrument, and a class for the study and practice of this art, under a competent teacher, would in many places be a powerful attraction to an Institute. At all their public meetings and festive gatherings, the performances of a good brass band would be of great service, and the perseverance requisite for the attainment of skill would be stimulated by occasional friendly contests with the bands of other Institutes. At Beverley Mechanics' Institution the brass band plays at the commencement and end of each lecture, so as to vary as well as to increase the attraction, and there are many opportunities for rendering such services beneficial.

But besides these, music may be made to play a very important part in weaning our working population from the insidious and destructive temptations of the public-house, if it be made easily accessible by a low charge for admission. It need not, however, be all the entertainment afforded, for instruction might be judiciously blended, and he who paid but a penny to be regaled with sweet sounds, could hardly complain if for ten minutes or a quarter of an hour, as a breathing interval for the musicians, he had to listen to an address in advocacy of mental cultivation, or the reading of some portion of English literature, in which the pursuit of praiseworthy objects was indirectly inculcated.

A discussion class, if it comprised but a few members who argued the questions with a reasonable amount of ability, might, by its weekly meetings being open, prove a valuable aid to the Institution. The publication of a list of questions suitable for discussion has removed many of the difficulties which formerly existed to the carrying on of such a class, and no doubt much may still be done to render this method of exciting intellectual rivalry still more attractive. None but members of the class should be allowed to take part in the proceedings, but as the condition of membership should only be the liability to introduce a subject for discussion by the reading of a short essay, there are many who would be tempted to join the class from a desire to offer their opinions upon a subject in which for the time at least they might feel an interest.

Popular readings, to which the public are admitted at the charge of a penny, have proved so successful at Ipswich and some other places, that little need be said in their advocacy. Not only are they attractive from the introduction of entertaining literature, but they may be made really useful by varying that which is amusing with that which is instructive. Biography, when it illustrates the conquest of difficulties by perseverance, is often more profitable as an incentive to imitation than direct precept; and many a tale, though ostensibly designed for amusement, conveys lessons which can hardly fail of producing some good fruits. The mere names of English authors whose works might be read with advantage, would form a long catalogue, but no library of any pretensions can be without abundant materials.

Another mode, which was practiced with some success at an Institute near Manchester, was for each member in turn to read some portion of a well-known author. This was followed by a discussion, in which the members criticised not only the author, but the manner in which the work had been read. The effect was to improve the

members in the art of reading—no mean accomplishment—many of them becoming very proficient. In a small colliery village near Leeds, where a reading room was established last year, much advantage was gained by one of the members reading to the others. This was done almost every evening, and the effect was to induce many to attend who would otherwise have been in the public house.

I am, &c.,

BARNETT BLAKE.

Leeds, Aug. 18, 1861.

Proceedings of Institutions.

BARNSTAPLE LITERARY AND SCIENTIFIC INSTITUTION.—

The seventeenth annual report congratulates the members upon the fact that the Institution has been making a decided, though gradual, advance in most of its departments. While the progress of the year has been attended by features of an encouraging character, it has been marked by one circumstance which will affect in an important manner the patronage of the Institution. The death of the late lamented Earl Fortescue, ever since the foundation of the Institution its honoured president, renders that office vacant; and the council cannot refer to this sad event without placing on record their estimate of his high and noble character. By the vacancy which thus occurs, an opportunity is afforded to the members of this Institution of recognizing the immense benefits which have been conferred on them by the munificence of Mr. Rock. The council, therefore, suggest that Mr. Rock be elected to the office of president, confident that such claims as those of our benefactor and patron will only be duly met by the bestowal of the highest compliment which it is in the power of the members to offer. In the library the council have continued to make improvements in the arrangement of the books, and in other details, and the total issues of the year are in excess of the average. The reading rooms have been supplied, as heretofore, with the leading newspapers, magazines, and serials of the day. The council have much pleasure in being able to make a more gratifying report of the past lecture session than in some former years. Still much remains to be accomplished in order to place the lecture department of the Institution on the footing which so important a branch of educational operations should obtain. To the attainment of excellence in this department, the co-operation of gentlemen of scientific and literary endowments resident in the neighbourhood is necessary, as the funds of the Institution would be inadequate to the necessary provision without it. Such has of late, from whatever cause, been withheld, with a few exceptions; but the council earnestly invite the assistance of residents who may be qualified to aid in this work. The report of the classes this year is, when compared with some former years, very satisfactory. Fewer classes have, it is true, been formed, but they have been attended more numerously and regularly, and more tangible and appreciable results have followed. The drawing class has been undertaken this session by Mr. Alexander Lauder, who enlarged the sphere of study, introduced chalk drawing from models, and obtained very satisfactory results. He has also established a class for design, and a competition has taken place for prizes offered by Mr. R. W. Cotton and Mr. Tamlyn. The drawing class opened with 25 members, who were soon increased to 35; when it was found expedient, owing to the narrowness of accommodation, to close the class. After testing the attainments of the students, and ascertaining their probable future vocations, they were divided into two classes for free-hand and mathematical drawing. The talent and progress of the class for free hand drawing soon developed a third class for drawing from the round in pencil and crayon, and the remarkable progress of the class in so short a period of time is very encouraging. A supplementary design class was also formed with the advanced students,

who received a given subject, and at their homes were expected fortnightly to produce their original conception of the subject given. In the mathematical class the first evening of the session found 21 young men willing to attend. This number increased to 37, giving an average attendance of 24.4 for the session. On subjecting the class to an individual examination, it was discovered that their attainments were of a very rudimentary character, many being ignorant even of the relative value of the digits. Earnestness characterised the majority, which has been evidenced by their regularity and diligence, and especially by their readiness to supplement the ordinary class studies by problems worked out at home. One great want soon apparent was, a power to express their results neatly and logically; to remedy this a written monthly examination was instituted. The papers were then valued, and a class list produced and publicly exhibited in the class room; thus, in addition, creating a healthy stimulus amongst the young men. On comparing the papers in the earlier examinations with the more recent ones, marked progress is evidenced. The average out of the maximum of 100 reached in November was 60.9, the average for February 98.1. A class for the study of the French language has been taught by Mons. Rottger, and has been attended by an average amount of success. The meteorological department still continues under the superintendence of Mr. Mackrell; two observations daily have been taken by the librarian, and registered during the last two years, which has given greater precision to the results thus obtained. At the solicitation of a member of the Meteorological Society, London, Mr. Galton, a third observation has been supplied to him reduced to sea level, taken simultaneously with other observers, at 9 o'clock, p.m., during the month of December last, the object of this night observation being to assist in furnishing data for the construction of a set of synchronous weather charts, with illustrated diagrams, a copy of which is to be presented to each contributor. The council in a former report stated respecting the museum that it "might be said to have so far failed as to justify the belief that it would be expedient to abandon it altogether." Shortly after this course had been decided on, a valuable collection of geological and mineral specimens was presented to the Institution by Mrs. Hill. A museum of local geology and mineralogy is thus likely to be formed. The balance-sheet shows that the receipts have been £316 0s. 1d., and that there is a balance in hand of £8 16s. The following is a list of lectures delivered:—Dr. Daniell: "The Fall of the First French Empire;" "Hundred Days of Napoleon the Great;" Rev. W. Tarbotton: "On Ghosts;" Rev. G. Waterman: "The Wonders of the Microscopic World;" Henry Jordon, Esq.: "Queensland, the New Colony of Australia;" The Torrington Glee Union: A Concert; George Buckland, Esq.: A Musical Entertainment, entitled "Scenes and Incidents from English History." The issue of books and periodicals amounts to 10,042. There are in the library 5,123 volumes, of which 163 have been added during the past year. The number of members is 341.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par
Numb.

Delivered on 25th July, 1862.

- 426 Scottish Universities—Papers.
- 433. Chelsea Bridge—Return.
- 442. Registration of Titles, &c. (Ireland)—Return.
- 443. Constabulary (Ireland)—Return.
- 223. Bills—Bankruptcy Act (1861) Amendment.
- 230. " Writs Prohibition.
- 231. " Tralee Savings Bank (No. 2.)

Delivered on 26th and 28th July, 1862.

- 428. East India (Oude Claims)—Return.
- 358. Dwelling Houses, &c. (Scotland)—Return.
- 436. Gold Coin and Treasure—Returns.
- 440. Ceylon—Return.
- 447. Poor Relief (Lancashire, &c.)—Return.

- 444. Standing Orders Revision—Report from Committee.
- 437. Local Taxation Returns Act—Paper.
- 232. Bills—Night Poaching Prevention (amended).
- 233. " Burial Boards (Mortgage of Rates).
- 234. " Council of Medical Education.
- 235. " Coal Mines, Lords Amendments.
- 236. " Police and Improvement (Scotland), Lords Amendments.
- 237. " Elections (Ireland)—Lords Amendments.
- 238. " Industrial and Provident Societies, Lords Amendments.
- 232 (a.) Night Poaching Prevention, Amendments to be moved by Sir George Grey.

Delivered on 25th July.

Public General Acts—Cap. 31 to 35.

Delivered on 29th July, 1862.

- 419. Annuities—Account.
- 431. East India (Sale of Waste Lands, &c. Dissents)—Return.
- 431 (1.) East India (Sale of Waste Lands, &c. Instructions)—Return.
- 434. Coinage—Accounts.
- 435. Australian Colonies (Imports)—Return.
- 438. Durham University—Papers.
- 445. Maltsters—Returns.
- 449. Army Prize Money—Account.
- 229. Bills—Stipendary Magistrates (as amended in Committee, and on Re-commitment).
- 240. " Union Relief Aid (amended).

Delivered on 30th July, 1862.

- 45 (6.) Trade and Navigation Accounts (30th June, 1862).
- 451. Barrack Masters—Return.
- 461. Barrack Masters (Military Store Keepers)—Return.
- 424. Skibbereen and Castletown Boards of Guardians—Return.
- 239. Bills—Thames Embankment, Lords Amendments.
- 241. " Poaching Prevention (as amended in Committee, and on Consideration of Bill, as amended).
- 242. " African Slave Trade Treaty (No. 2).
- 243. " Companies, &c., Lords Amendments.
- 244. " Parochial Assessments, Lords Amendments.
- 245. " Metropolis Local Management Acts Amendment, Lords Amendments.
- 246. " Confirmation of Sales, &c.

Public General Acts—Cap. 36 to 46.

Delivered on 31st July, 1862.

- 454. East India (Breach of Contracts Bill)—Return.
- 456. Unclaimed Wreck—Returns.

SESSION 1861.

- 492. Chaplains in Workhouses—Return.

Delivered on 1st August, 1862.

- 307 (A 2.) Poor Rates and Pauperism—Return (A.)
- 459. Stipendary Magistrates (Ireland)—Return.
- 247. Bills—Union Relief Aid (as amended in Committee, and on re-commitment).
- 248. " County Surveyors (Ireland), Lords Amendments.
- 249. " Highland Roads and Bridges, Lords Amendments.

Copies of the under-mentioned Papers, presented by Command, will be delivered to Members of Parliament applying for the same at the Office for the Sale of Parliamentary Papers, House of Commons:—

- 52. Convict Prisons—Reports.
- 53. Reformatory Schools—Fifth Report.

Delivered on 2nd and 4th August, 1862.

- 452. Fisheries (Ireland)—Return.
- 453. Thames Conservancy—Paper.
- 463. Land Improvement Act (Ireland)—Return.
- 409. Population and Representation—Returns.
- 446. Fortifications—Account of Moneys raised and issued, &c.
- 460. Hops—Returns.
- 481. Supply and Ways and Means (Session 1862)—Return.
- 482. Redundant List (Public Departments)—Return.
- 251. Bills—Lunatics Law Amendment, Lords Amendments.
- 252. " Charity Commissioners' Jurisdiction, Lords Amendments.
- 253. " Poor Removal, Lords Amendments.

Delivered on 5th, 6th, and 7th August, 1862.

- 458. Civil Services—General Abstract of the Grants for 1862-3 and 1861-2.
- 173. Public Health—Fourth Report of the Medical Officer of the Privy Council.

- 464. Naval Prize Money, &c.—Account.
- 466. Income and Property Tax—Returns.
- 473. Baronies (Ireland)—Return.
- 489. Registration of Deeds (Ireland) Act—Return.
- 462. Standing Orders of the House of Commons.

China (Employment of Officers in the Naval or Military Service of Her Majesty)—Correspondence.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, August 15th, 1862.]

Dated 3rd June, 1862.

- 1676. J. Fincham, Beck-row, Mildenhall, Suffolk—An arrangement or arrangements of mechanism useful for facilitating the repairing of roads and ways, also applicable for the tilling of land.

Dated 17th July, 1862.

2043. M. Kuris, 151, Bishopsgate-street Without—A new or improved material to be used in the manufacture of handles for umbrellas, parasols, and walking sticks.
2045. H. Appleby, Tavistock-place, Plumstead—Imp. in armour plates for ships of war, floating and land batteries, and other like purposes.
2047. J. Schloss, Cannon-street—Imp. in pouches.
2040. T. B. Duff, 2, Queen-square, Westminster—Imp. in the manufacture of vulcanised india-rubber thread.

Dated 18th July, 1862.

2055. J. S. Jarvis, Wood-street—Imp. in shirt collars.
2057. C. A. Day and T. Summers, Southampton—Imp. in sheer legs.

Dated 19th July, 1862.

2059. G. J. Yates and J. W. W. Tindall, Liverpool—A process of deodorising paraffin, coal, pitch, rock, and other like oils and hydro-carbons.
2061. R. A. Brooman, 166, Fleet-street—Imp. in revivifying animal black, in apparatus employed therein, and in recovering a product employed in the revivification. (A com.)
2063. A. Pratt, Devonshire-place, Wandsworth-road—Imp. in self-capping fire-arms.
2065. W. E. Newton, 66, Chancery-lane—Imp. in machinery for preparing fibrous substances for combing. (A com.)
2067. W. Tranter, Birmingham—Imp. in fire-arms.

Dated 21st July, 1862.

2070. E. Bazin, Angers, France—An improved electric railway carriage signal.
2073. A. M. Fell, Auchanard, Linlithgow, N.B.—Imp. in obtaining or manufacturing sulphate of ammonia and manure.

Dated 22nd July, 1862.

2077. T. Meriton, Hamburgh—Imp. in steam engine governors and speed regulators for machinery.
2079. P. F. Cassegrain, Paris—Imp. in fire arms.
2081. Dr. W. Smith, Over Darwen, Lancashire—Certain imp. in power-looms for weaving.
2085. W. Crofts, New Lenton, near Nottingham—Imp. in the manufacture of fabrics by lace machinery, and in the means or apparatus employed therein.
2087. H. R. Summons, Navarino-terrace, Dalston-road—Imp. in machinery for bordering envelopes, paper, and cards.
2089. G. Payne, Grantham—Imp. in horse shoes.
2091. A. C. Vautier, Paris—Imp. in obtaining fibrous materials, and fibrous and textile fabrics, and in producing agents used in part of the invention.

Dated 25th July, 1862.

2116. W. Clark, 53, Chancery-lane—Imp. in rafts or structures applicable for the ordinary purposes of marine and inland navigation, as also for saving life in cases of shipwreck or otherwise. (A com.)

Dated 29th July, 1862.

2152. G. Waldie, Linlithgow, N.B.—Imp. in colour printing, and in the machinery or apparatus employed therein.

Dated 30th July, 1862.

2162. W. Wanklyn, Bury—Imp. in apparatus for opening and conditioning East Indian and other tightly compressed cottons.

Dated 31st July, 1862.

2170. E. F. Prentiss, Birkenhead, and R. A. Robertson, Liverpool—Imp. in obtaining products from rock oil, coal tar, and other like mineral substances in a more or less pure and deodorised state, and in the apparatus to be used therefor, and which is also applicable to distillation in general.
2172. J. Ransom and E. Ransom, Kempston, Bedfordshire—Imp. in mounting mill stones.

Dated 1st August, 1862.

2178. J. Sinclair, Glasgow—Improved arrangements for ventilating, and in part applicable for fumigating.
2180. G. Haseltine, 100, Fleet-street—Imp. in apparatus for drying grain, gunpowder, and other granular substances. (A com.)
2182. J. C. Onions, Birmingham—Imp. in portable forges.
2184. J. E. Marsh, Birmingham—An imp. or imps. in metal rivets used in joining or securing together parts of boots, shoes, and other articles of leather, and also in machinery for making such rivets.

Dated 2nd August, 1862.

2188. T. Onion, Calais, France—Imp. in rotary steam engines, and in propellers adapted to propelling vessels in water.
2190. J. Gray, Glasgow—Improved arrangements for cleaning ships' bottoms, and for preventing the fouling thereof.

2192. C. Warne, Syleham Mills, near Scole, Norfolk—Imp. in the manufacture of linen drabnett.

Dated 5th August, 1862.

2196. J. Thoma, 35, Poland-street, Oxford-street—An improved self-adjusting screw wrench.
2202. A. Priestley, Huddersfield—Imp. in arrangements or apparatus applicable to locomotive railway engines and carriages for distributing sand upon the rails to give adhesion to the driving and brake wheels of such engines and carriages.

Dated 6th August, 1862.

2204. J. C. Richardson, Lichfield—An imp. or imps. in cleaning cotton waste.
2206. W. G. Valentin, Oxford-street, and F. Levick, Blaina, Monmouth—Imp. in the generation of combustible gas for lighting and heating purposes, and in the mode of applying such gases to the manufacture of iron, glass, and other processes in the arts where great heat is required.
2208. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the construction of armour plates for ships and forts, and applicable to other like purposes. (A com.)

Dated 7th August, 1862.

2210. C. Culling, Downham Market, Norfolk—Imp. in fire-arms.
2214. R. A. Brooman, 166, Fleet-street—Imp. in ships and vessels, in order to prevent injury from collisions.
2216. W. Clark, 53, Chancery-lane—Imp. in the rig, spars, and sails of ships and other vessels. (A com.)
2212. R. W. Ralph, Honnington-grange, near Newport—Certain imp. in or applicable to reaping machines.

PATENTS SEALED.

[From Gazette, August 15th, 1862.]

August 15th.	
410. J. Cooke.	457. C. Wood.
413. J. Chatterton & W. Smith.	459. J. Spence.
415. A. H. Harrison.	464. E. S. Crease.
419. H. Crawford, J. Crawford, R. Crawford, and R. Templeton.	465. R. Pickin & W. E. Pickin.
428. R. Watkins.	467. W. McAdam & W. Chrystal.
430. J. Lees.	469. H. Chavasse, T. Morris, and G. B. Haines.
434. W. Firth.	479. D. B. White.
435. C. T. Marzetti and J. Watson.	483. W. B. Johnson.
436. J. T. Pendlebury and G. Pendlebury.	505. W. Clark.
441. N. Symons.	525. W. Miller.
443. W. Hinton.	527. W. Clark.
444. W. Davis.	547. J. C. Ratliff.
445. J. Paterson.	555. J. Giers.
448. J. Wilcox.	601. E. Partington.
450. J. Friedlaender.	643. W. J. Bennett.
455. J. Paterson.	751. T. Duun.
456. J. Paterson.	1182. A. Robertson and R. Barter.
	1473. C. Attwood.
	1651. W. E. Newton.
	1653. W. E. Newton.
	1798. J. H. Johnson.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, August 19th, 1862.]

11th August.		15th August.	
1887. D. Campbell.		1993. W. Wilson.	
1936. T. Briggs.		1941. A. P. Chamberlain.	
13th August.		16th August.	
1939. H. Smith & T. W. Ashby.		2965. H. O. Robinson.	
1991. J. Chatterton.		1893. H. Medlock.	
2341. F. Levick.		1908. J. Fowler, jun., R. Burton and D. Greig, jun., E. E. Allen, and W. Worby.	
14th August.			
1946. J. M. Hetherington.			
1972. G. Collier.			

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, August 15th, 1862.]

July 29th.	
1747. A. Allan.	
[From Gazette, August 19th, 1862.]	
29th July.	
1747. A. Allan.	1841. G. Sanders & R. E. Donovan.
11th August.	
1871. G. Collier.	1848. S. Statham and W. Smith.
15th August.	
2058. J. C. G. Kennedy.	1867. W. E. Baker.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4499	Aug. 8	Cornice Pole and Curtain Rod	Samuel Walker, jun.	Birmingham.
4450	" 9	{ Instrument for finding the Centres of Ovals and Circles, and dividing them into equal parts	Messrs. Herrington and Hall.	William-street, Clerkenwell, E.C.
4451	" 11	{ Fastening for Brooches, Pins, Links, and Articles of Jewellery	Samuel Phillips	Birmingham.
4452	" 14	Screw Wrench or Spanner	Thomas Wilson	Birmingham.

Journal of the Society of Arts.

FRIDAY, AUGUST 29, 1862.

INTERNATIONAL EXHIBITION OF 1862.

SEASON TICKETS.

Season Tickets may be obtained at the Society's House, on application to Mr. S. T. Davenport, Financial Officer. The prices of the tickets are as follows:—£2 10s., admitting to the International Exhibition and the Gardens of the Royal Horticultural Society every day during the remainder of the season; £1 10s., admitting to the Exhibition only, every day; and 10s., admitting to the Exhibition on shilling days only.

The delivery of the Medals and Certificates of Honourable Mention to the Exhibitors cannot take place till after the close of the Exhibition, when it will be made at a public ceremony in the building, to which will be admitted the holders of all classes of season tickets (except those for shilling days), and the public on payment of £1 each.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s.; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

AWARDS OF MERIT.

The following circular has been issued; a copy will be furnished to any exhibitor on application to the Secretary of the Society of Arts.

Society for the Encouragement of Arts, Manufactures,
and Commerce,
John-st., Adelphi, London, W.C., Aug. 1862.

SIR,—The Council of the Society of Arts have decided to invite the opinion of the Jurors, the Commissioners for the Colonies and for Foreign Countries, and the principal

Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and I am directed by the Council of the Society of Arts to transmit to you the accompanying Queries, with a request that you will favour them with your views on the subject, it being the intention of the Council to embody the answers they may receive in a public Report:—

- 1.—Are you of opinion that Awards for Merit, by Medals or otherwise, in International Exhibitions, are desirable?
- 2.—State the reasons for your opinion.
- 3.—Ought Works of Fine Art and Designs to be excluded from the Awards?
- 4.—Can you suggest any better method than the appointment of Jurors for making the Awards?
- 5.—Can you suggest any improvement in the Constitution or proceedings of the Juries?
- 6.—Is any Appeal from the decision of Juries desirable?
- 7.—If you think Awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?
- 8.—Have you any further suggestions to offer on the subject?

It is particularly requested that any replies with which you may favour the Council may be sent not later than the 15th of September, and that they may be written on foolscap paper, on one side only, with an inch margin, and numbered corresponding to the number of the questions.

I am, Sir,

Your obedient Servant,
P. LE NEVE FOSTER,

Secretary.

NOTICE TO INSTITUTIONS.

The Programme of Examinations for 1863 is now ready, and two copies have been sent to each Institution in Union and Local Board. Additional copies may be had gratis on application to the Secretary.

The Papers set at the last Examination are now published in the form of a pamphlet, which may be had of Messrs. Bell and Daldy, Fleet-street. Price Sixpence.

Those Secretaries of Institutions who have not already forwarded to the Secretary of the Society of Arts copies of their last Annual Reports, are requested to do so.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October.

INTERNATIONAL EXHIBITION OF 1862.

VISITS OF SCHOOLS.

In the return published in the *Journal* for the 15th inst., the female students of the Schools of Design, eight hundred in number, who were admitted on half-crown days by tickets presented to them by Her Majesty the Queen, were not included.

INTERNATIONAL EXHIBITION OF 1862.

VISITS OF SCHOOLS (*Continued*).

The following is a continuation of the Return of Schools reported to Her Majesty's Commissioners as having visited the Exhibition, up to the 21st instant, inclusive:—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.	
Aug. 4	Staines	British	Committee	25	37	
" "	Eynsham, Oxon ...	Bartholomews	The Trustees	12		
" 5	Highgate	Night	{ Revds. J. Hulcombe and J. Beaumont .. }	17	701	
" "	Wrotham, Kent ...	Choir	Rev. F. Lane	16		
" "	Chelsea	Duke of York's... ..	Secretary for War ...	213		
" "	Temple Bar	Ragged	Managers	11		
" "	Lisson-grove	Do.	Subscription	22		
" "	New Brompton, } Chatham	Choir	Rev. A. Willis... ..	22		
" "	Isleworth, Middlesex	British	Baroness Rothschild... ..	20		
" "	Rochester	St. Peter's... ..	Subscription	85		
" "	Chatham	St. Bartholomew				
" "	Rochampton	Parochial	Rev. Dr. Bibur... ..	44		
" "	Banbury	British	Subscription	12		
" "	Kensington	St. Margaret's	Do.	66		
" "	Ravensden, Beds ...	Sunday	Do.	34		
" "	Stowe	National	Duke of Buckingham ...	50		
" "	Ship-yard, Temple } Bar... ..	Shoe-black (red)	Committee	11		
" "	Crayford, Kent ...	St. Mary's... ..	Mrs. Barnwell	19		
" "	Mill-end	Mill-end, Old-town... ..	Committee	59		
" 6	Farnham	National	Committee	48	782	
" "	Margaret-street ...	All Saints	Mrs. Byron	39		
" "	St. Albans... ..	National	Rev. F. Lipscomb	14		
" "	Acton	Do.	Baron Rothschild	205		
" "	Abbots Langley ...	Do.	Subscription	62		
" "	Westminster	Grey Coat... ..	Governors... ..	100		
" "	Chelsea	Duke of York's... ..	Secretary for War ...	207		
" "	Bishopsgate-street ...	Turners' Free	Governors	26		
" "	Bath	Blue Coat... ..	Rev. C. Kendle	30		
" "	Gravesend... ..	British	Subscription	13		
" "	Andover	Abbott's Ann	Hon. and Rev. S. Best ...	38		
" 7	Lingfield, Surrey ...	National	Subscription	45	770	
" "	Tunbridge Wells ...	Do.	Do.	50		
" "	Burstard, Kent ...	Do.	Do.	36		
" "	Clapham-park	All Saints	Rev. John Scott	66		
" "	Clerkenwell	Parochial	Subscription	200		
" "	Hendon	British	Thomas Spalding, Esq. ...	53		
" "	Feltham	National	Subscription	31		
" "	Hampton	Grammar	Do.	96		
" "	Leytonstone	National	Committee	22		
" "	Southborough	Do.	Mr. Henry Crundwell ...	67		
" "	Bryanston-square ...	St. Mary's	Rev. R. Rutland	84		
" "	East Barnet	National	Committee	20		
" 8	West Titcherly, } Hampshire	National	Thos. Baring, Esq.	50	50	
" 11	Grove - road, St. } John's-wood	Female Orphans	W. Marshall, Esq.	22		
" "	Ship-yard, Temple- } bar	Shoeblack	Committee	12	111	
" "	Horsham, Surrey ...	National	Do.	16		
" "	Bromham (Beds) ...	Do.	Hon. Misses E. & S. Trevor	15		
" "	Chichester... ..	Blue Coat... ..	Governors... ..	46		
" 12	Eachfort (Wilts) ...	National	Lady Charlotte Taylor ...	15		
" "	Windsor	Industrial	Subscription	33		
" "	Paddington	St. John's	Hon. Mrs. Kinnaird... ..	22		
" "	Guildford	McDonald's (Boys) ...	Major McDonald, R.E. ...	60		
" "	Hertford	Green Coat	Subscription	23		
" "	Horsell (Surrey) ...	National	Do.	20		

RETURN OF SCHOOLS (Continued).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Aug. 12	Woking	Academy	W. Ross, Esq.	11	366
" "	Ealing	British	Baroness Rothschild ...	168	
" "	Hanwell	Central London	Managers	14	
" 13	Seaford, Sussex ...	Sunday	T. Crook, Esq.	59	362
" "	Stamford-hill ...	Hermitage... ..	Chas. Shaw, Esq.	61	
" "	Tunbridge Wells ...	National	Rev. G. Woodgate	27	
" "	Edmonton... ..	Baptist	G. P. Bacon, Esq.	22	
" "	Maidstone... ..	Blue Coat... ..	Trustees	107	
" "	Broxbourne	Broxbourne	G. J. Bosanquet, Esq. ...	57	
" "	Spitalfields	Booth-street	Rev. J. Patterson	14	
" "	Slough	British	Jas. Startup, Esq.	15	
" 14	Winkfield	Evening	A. Gilliat, Esq.	32	370
" "	Willesden	Parochial	Subscription	124	
" "	Agar Town	Ragged	Mrs. Burchett	21	
" "	Wandsworth	British	Committee	73	
" "	Isleworth, Middlesex...	Do.	Baroness Rothschild ...	22	
" "	Hurst, Reading... ..	St. Nicholas (Choir)...	Rev. A. A. Cameron	7	
" "	Lancaster	National	The Mayor	80	
" "	Hanover District } Church }	Choristers	Rev. T. G. James	11	
" 15	Wood-green, Tot- tenham }	Royal Masonic	Subscription	61	61
" 18	Watford	National	Rev. W. L. James	87	
" "	Do.	Free	G. Rooper, Esq.	21	
" "	Franfield	National	Rev. E. Docker	21	129
" 19	Marlborough	Parochial	Subscription	45	
" "	Do.	Grammar	Trustees	40	
" "	Romsey, Hants. ...	Nowes's Charity	Trustees	25	
" "	St. James, West- minster }	Workhouse	Governors	126	
" "	Brixton	St. Ann's Society	Subscription	79	
" "	Enfield	Industrial	Committee	32	
" "	Wade's Mill	National	R. Hautnay, Esq.	30	
" "	Burford, Oxon	Choir... ..	Rev. J. H. Burgess	11	412
" "	North Mimms ¹	National	{ W. Campbell and R. W. Gawson, Esqs. }	24	
" 20	Fulham	Union	Subscription	73	
" "	Bath	Forum	Committee	13	
" "	Kilburn	Private	Mr. Rollins	27	
" "	Camberwell	Missionary	Mrs. Bennecker	16	
" "	Bolton-street, Ken- nington }	Sunday	Rev. C. H. Wyche	25	
" "	Westminster	Wesleyan College	J. R. Kay, Esq.	50	
" "	Pinner	Commercial Travellers'	Subscription	157	361
" 21	Ditchling	National	Subscription	17	
" "	Rochester	St. Nicholas	Do.	60	
" "	Knightsbridge	All Saints'... ..	Do.	50	
" "	Paddington	St. James's	Committee	56	
" "	Ipswich	Christ's Hospital	Governors... ..	20	
" "	Abingdon	Union	Do.	47	
" "	Paddington	Girls' Home	Mrs. A. Mills	27	
" "	City of London... ..	Farringdon Within	{ Alderman Phillips and Deputies }	120	908
" "	Westminster	Wesleyan Training College	J. R. Kay, Esq... ..	20	
" "	St. Saviour's, South- wark }	Mrs. Newcommen's... ..	Wardens	223	
" "	New-cross, Deptford	Warehousemen and Clerks'	Committee	63	
" "	Hill-street, Dorset- square }	Cripples' Home	R. Broughton, Esq.	21	
" "	Westminster	Wesleyan	J. R. Kay, Esq.	20	
" "	Walthamstow	British	Mrs. Barclay	54	
" "	Hampton Wick	Sunday and Day	Subscription	110	

VISITS OF WORKMEN.

The following is a return of the number of workmen, mechanics, operatives, and others who have visited the building in parties, from June 9th to August 21st:—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
June 9	Workmen employed on the Building... } ...	Metropolis... } ...	Her Majesty the Queen ...	3,000
" "	Foresters ... }	Town and country ... }	Subscription ... }	14,000
" 12	Workmen ... }	Westminster ... }	Mr. Cochrane ... }	150
" "	Operatives... }	St. Martin's-lane ... }	Messrs. Richards ... }	200
" 19	Insane Females... }	Camberwell ... }	Dr. Armstrong ... }	80
" 23	Naval Reserve ... }	Blackwall ... }	Capt. Lacy and Officers ... }	250
July 1	Workmen and Families ... }	Britannia Iron Works ... }	Messrs. H. and F. Howard... }	850
" 5	Cotton Spinners ... }	Bradford ... }	W. E. Foster, Esq., M.P. ... }	545
" 20	Men, Wives, and Children of the 31st Depot ... }	Chatham ... }	Capt. Prevost ... }	200
" 22	Shipwrights ... }	Blackwall ... }	Messrs. Mare and Co. ... }	2,000
" "	Paper Makers ... }	Woburn, Bucks ... }	Messrs. Thomas ... }	64
" "	Men, Wives, and Children of the 52nd Regiment ... }	Chatham ... }	Capt. Henley ... }	85
" "	Men, Wives, and Children of the 83rd Regiment ... }	Do. ... }	Capt. Pickett ... }	90
" 29	Operatives... }	... }	Messrs. Watts and Son ... }	152
" "	Do. ... }	Chatham ... }	Government ... }	2,000
" "	Cavalry ... }	Maidstone... }	An Officer ... }	50
" "	5th Lancers ... }	Kensington ... }	General Chatterton ... }	50
" "	60th Rifles... }	Aldershot ... }	Capt. W. F. Carlton ... }	51
" 30	Villagers ... }	Cuckfield ... }	Subscription ... }	550
Aug. 1	Aged Poor ... }	St. Giles's Workhouse ... }	Guardians ... }	100
" 4	Biscuit Bakers ... }	Ratcliffe-cross ... }	Messrs. Perkin and Salmon... }	40
" "	Mechanics... }	Turin... }	Government ... }	36
" "	Parishioners ... }	Claypole, Lincolnshire ... }	Subscription ... }	38
" 6	Operatives... }	Bury, near Birmingham ... }	Albright and Wilson ... }	95
" 7	Female Servants ... }	Paddington ... }	Hon. Mrs. A. Kinnaird ... }	10
" "	Clothworkers ... }	Stanley Mills, Strood ... }	{ Messrs. Marley and Stra- } han ... }	960
" "	Workpeople ... }	Bristol ... }	Messrs. Derham, Brothers ... }	700
" "	Middlesex Volunteer Engineers ... }	Tower Hamlets... }	Capt. Bentall ... }	100
" 11	Workpeople ... }	Strood ... }	{ Messrs. Roberts, Gowling, } and Co. ... }	300
" "	Excursionists ... }	Vienna ... }	Subscription ... }	352
" "	Workmen ... }	Canterbury ... }	Smith Bell, Esq. ... }	21
" "	Workpeople ... }	Woburn, Bucks ... }	A. Gilbey, Esq. ... }	81
" 13	Lascar Seamen... }	Ship "Brandon" ... }	Owners ... }	34
" "	Tanners ... }	Guildford ... }	Messrs. Bink and Co. ... }	13
" "	Villagers ... }	Balcombe, Sussex ... }	{ J. J. Hankey and — Ro- } binson, Esqs. ... }	97
" 14	Workmen... }	Phoenix Gas Company ... }	The Directors ... }	600
" "	Tanners ... }	Bristol ... }	Messrs. Evans and Co... }	60
" "	Brushmakers ... }	Do. ... }	Messrs. Brison and Co... }	60
" 18	Workpeople ... }	Bromley ... }	Harper Twelvetees, Esq. ... }	450
" 19	Military Train... }	Woolwich... }	The Officers ... }	27
" 20	Workmen ... }	City-road ... }	Messrs. Pitt and Co. ... }	60
" 21	Needlewomen ... }	Abingdon ... }	{ Messrs. Hyde, Son, and } Clark ... }	960

PRODUCTS OF NATAL AT THE INTERNATIONAL EXHIBITION.

The following information, in reference to some of the products of this colony, is taken from the Descriptive Catalogue, by Dr. Mann, F.R.S.A., Hon. Secretary to the Natal Commission:—

In the year 1850 Mr. George Marcus manufactured a specimen of sugar in Natal, with a pair of rude wooden rollers and a common cooking pot, from green Natal canes, purchased from a Kafir. The specimen was taken

down to Durban and exhibited as a curiosity. About the same time Mr. Moorewood introduced a superior quality of cane. In the present year sugar mills are established entirely along the coast, from the Nonoti to the Umzinto. There are now plantations at the Umtata and Pesang Rivers, at the Umhlali, at the Tongaat, and the Umhloti, on the flats between that river and the Umgeni, round the mouth of the Umgeni; at the Umlaze and Isipingo; at the Unkomanzi, and between the Unkomanzi and the Umzinto. During the last two years, close upon 2,000 tons of sugar, of a value exceeding £50,000, have been

exported from the colony, besides the very large quantity consumed by its own population. The twelve specimens exhibited, drawn from the Umzinto, the Umkomanzi, the Isipingo, the Umgeni, the Umhloti, and the Umtata, satisfactorily show the quality that can already be produced by the planters of Natal. The coast-climate and coast-soil are alike eminently calculated for the growth and manufacture of this most valuable export. The only drawback at present experienced is the occasional influence of frost in certain low-lying and damp localities. The hill sides appear to be free from this visitation, which, however, seems to affect the quantity more than the quality of the produce.

The climate of Natal proves to be admirably adapted for the production of arrowroot. The moist summer, dry sunny winter, and abundance of clear running streams, are all circumstances favourable to its growth and manufacture. During the last two years, the unusual prevalence of drought, and the low price of the commodity in the English market, have tended to withdraw the attention of settlers from its cultivation. Not less than six thousand hundredweights, of a value exceeding eleven thousand pounds sterling, have nevertheless been exported from Natal during the last two years. The fine specimens furnished to the Exhibition are all of the last year's manufacture.

Coffee is now grown successfully in three or four localities in the neighbourhood of Durban. It thrives in a red soil of frequent occurrence on the landward side of the coast hills. The cultivation proves to be exactly adapted to the peculiarities of the coolies recently introduced into Natal from India. There are altogether something approaching to two hundred acres of land under coffee plantation at the present time, with a prospect of producing, at existing prices, in the Natal market, a return of from £25 to £50 per acre per annum. Coffee already planted promises to yield, under skilful management, in Natal, an income of something like four thousand pounds a year, upon an investment of sixteen thousand pounds.

Wheat is successfully grown on the high lands above Maritzburg, but cannot be produced to any serviceable extent upon the coast. It is, however, not without antagonists, even on the high lands, arising out of the wetness of the summer season. The Dutch farmers (boers) send a large quantity into the markets. The home demand is almost entirely supplied by colonial agriculture; but at certain seasons the price is liable to be greatly enhanced in consequence of the uncertainty of the supply, and of the constant influx of fresh mouths by immigration.

Barley of the finest quality can be readily grown on the uplands, but at present it is not put to any particular use within the colony. Oats are sown in large quantities around the towns, but are principally cut and employed in the straw for forage. Only small quantities are harvested and threshed. In the neighbourhood of Durban and Maritzburg, large sums of money are made by the growth of forage. Most lands yield two crops of them in the year. The tract of country in which the English grain crops thrive, lies at an altitude of between two and four thousand feet above the sea, where there is a mean temperature for the year of about 65°, but where frost is occasionally seen in winter time.

The maize flourishes everywhere throughout the colony. It is grown by the Kafir, as well as by the white colonists, in the greatest abundance. Every kraal has its mealie garden. The yield is exceedingly large, and it need be so, as it is the staple food of the Kafir throughout the land, as well as a common addition to the table of most white colonists, the average daily allowance of mealie meal for a Kafir being three pints. An acre of ground readily furnishes eleven muids of three bushels each. The mealie crop always commands a ready sale in the market. The price fluctuates between ten and twenty shillings the muid, according to the season, and after

long drought rises even above this. During the year 1861 mealie meal was sold at forty-seven shillings the muid in Maritzburg market.

The capsicum grows readily from Maritzburg to the sea, and is cultivated near Durban for commercial purposes. The Natal Cayenne pepper is of unquestionable excellence. Fifty-four hundredweights of chilies, worth £170, and twenty hundredweights of cayenne, worth £125, were exported last year.

Natal grows its own grain food, and looks to export sugar, arrowroot, and coffee. It has actually sent out of these food staples, in the last two years, value exceeding sixty-two thousand pounds. It also produces excellent bacon, hams, and biltong, which are nearly always to be obtained in the market. Its butter is chiefly the produce of the higher lands, and for the present is abundant, rather than choice, the manufacture being for the most part in the hands of the Dutch farmers. Besides the supply of the large and increasing demand of the colonial market, six thousand hundredweight, worth nearly thirty-four thousand pounds, have been exported in the last two years.

In the matter of vegetables the colony is exceedingly well off, or rather will be so, when men have leisure to give their thoughts to garden luxuries. The sweet potato, the underground tuber of a convolvulus, is perhaps the most important of the vegetable products, on the whole. It grows everywhere, and, under the most favourable circumstances, attains to an enormous size. It contains a large proportion of both starch and sugar, and is a constant article upon the tables of most colonists. The potato is grown in perfection in Maritzburg, and on the higher lands. The turnip and the carrot are common in gardens; the former is grown by Mr. Aldborough, an old Norfolk farming-man, settled some thirty miles to the west of Maritzburg, in a state that would do no discredit to old Norfolk lands. Peas and beans are furnished in the capital. The cucumber, gourd, melon, pumpkin, onion, and tomato, are found in every garden, in the highest luxuriance. A single bed of pumpkins, at Maritzburg, will fill a small room with its produce in a single year. In the gardens of the coast the banana, the papaw, pineapple, mango, guava, orange, natji, lemon, citron, and lime, tamarind, custard apple, Brazilian-cherry, rose-apple, and sour-sop, ripen with the greatest ease. The pineapple is almost as common as turnips in England. At Mr. Brander's, at the Umzinto, and at the American mission station, Mapumulo, in the Umvoti, oranges and natjis, a variety of the mandarin orange, are grown in waggon-loads, and are of the choicest quality. The orange is also very abundant in the warm valley of Weenen, some seventy miles from the sea, and some two thousand eight hundred feet above its level, where the groves bear already in great luxuriance, on account of this having been one of the earliest spots settled by the Dutch. The granadilla, the fruit of a small hardy species of passion-flower, is in every garden, from Maritzburg to the sea, and ripens its delicious fruit through six months of the year. The combined sharpness and fragrance of this abundant fruit render it exceedingly welcome through the season of greatest heat. It is no small tribute to its excellence to say, that it is only the new palate that can tolerate the addition of sugar and wine to its juice. The white mulberry grows both at Maritzburg and on the coast, like a weed, and with incredible luxuriance, furnishing the housekeeper with crops of very agreeable and wholesome fruit for two or three months at a stretch. The yellow peach is produced in such abundance at Maritzburg, and the Dutch homesteads of even the up-country, that in some localities pigs are fed for weeks upon it, and orchards may be seen literally paved with the stones of the fruit that have fallen unplucked, and rotted upon the ground. It requires a Dutch taste to appreciate this fruit in its raw condition, but it is a most estimable and wholesome substitute for the English plum in cookery, being of less luscious but of more delicate

flavour. The free-stone peach, the apricot, the nectarine, and the pear, ripen at Maritzburg. The apple is making a more frequent and a better appearance year by year, as Mr. Finmore, an experienced horticulturist, of Maritzburg, is giving his attention particularly to its cultivation. The fig, the grape, the medlar, and the pomegranate, are common in the gardens of Maritzburg. The raspberry and the strawberry may be ripened at Maritzburg, but they require considerable skill and care, owing to the frequency of the rains at the period of ripening. The loquat, a most delicious little fruit of a plant of the apple tribe, is found from Maritzburg to the sea. The over-praised and rank-flavoured Cape gooseberry, the fruit of a plant of the deadly night-shade tribe (*Physalis pubescens*), seizes upon waste land round dwellings, much as nettles and docks do in England, and is much esteemed. In addition to this long list, there are four other fruits so peculiar as to deserve a particular nook to themselves. One of these is known locally under its Kafir name, the Amatungulu, or, as it is more commonly called, the 'martin gula.' It is also not unfrequently distinguished as the Natal plum. It is not a plum, however, but the stoneless fruit of the *Arduina grandiflora*, a very pretty shrub, with glossy evergreen leaves and stout tri-forked spines, nearly allied to the blue periwinkles (*Vincas*) of England. The fruit looks like a purple plum when ripe, and has a milky juice of a fine acidulous flavour. It is only found in the neighbourhood of the coast, but is there cultivated largely for fences, and is much used in the production of a coarse kind of jam.

The Amatunduluka is a coast fruit well known to the Kafirs, but not yet to the white settlers. The Indian sorrel is a kind of mallow (*Hibiscus sabdrassa*), whose floral leaves yield an acidulous, and at the same time mucilaginous juice, which is easily converted into a fine red jelly, when the leaves are boiled in sugar, and the syrup is thickened to the necessary degree. The Indian sorrel jelly is no contemptible substitute for red currant jelly. But that favourite adjunct of mutton and venison is still more nearly approached, by a compound formed from a fruit originally brought from the Kei river, beyond the St. John's, and therefore called the Kei apple. This apple is the fruit of a species of ebony (*Diospyrus*), and is so acid, that it is used by the Dutch as a pickle without vinegar. The Kei apple, too, is a robust and evergreen shrub, armed with formidable spines. It is now extensively grown in and near Maritzburg, as a valuable garden fence.

In connection with the food-substances produced in Natal, tea deserves a passing notice. Some years since a few Assam plants were introduced by Mr. Plant, the Curator of the Botanic Gardens of Durban. After the death of Mr. Plant, his widow removed these plants to her new residence in the Umvoti. There they have so flourished and multiplied, that there are now some hundreds of their descendants, five feet high, and in the most healthy condition. The specimen of tea was prepared from these plants in a rude way. It has the full green-tea flavour, somewhat too strong, possibly on account of its newness and the rudeness of the process followed in its preparation. The shrub which produces Bushman's tea, *Catha edulis*, grows in the gardens of Maritzburg. This is the khat of the Arabs, employed by them as a nerve stimulant, and to cause wakefulness.

Among the raw materials serviceable to commerce and the arts, produced in Natal by animal life, mention may be first made of the spoils of the ox. South Africa has been, from the earliest portion of its civilized history, essentially a pasture land. The original Dutch inhabitants have always been surrounded by large herds. Not very long since the value of an ox was something like a pound. Recently considerable ravages have been made among the herds by the appearance of epidemic lung sickness. This, in connection with the enormously increased demand for ox flesh for purposes of land transport, has largely augmented the price of the animal in the

market. Twenty-five thousand hides of the ox and the buffalo, worth nearly ten thousand pounds sterling, were exported from Natal in the past year, the greater part of which came down from the Dutch states beyond the Drakensberg. The vast horns of the Basuto, or Macateese ox, a long-legged animal, are shown, whose head quarters are in the land of Moshesh, beyond the Drakensberg frontier, but not of much value in the colony; also the horns of the Fatherland ox, originally imported from Holland, and in high esteem for milking and for meat. The horns of the buffalo are brought down from beyond the mountains in considerable quantity; the animal is still occasionally seen in the higher lands of Natal.

The sheep thrives in many parts of the Natal uplands, and in the free states beyond, and is now being gradually introduced into the lower region, around the capital, with varying degrees of success. Gentlemen who have had large experience in the management of sheep in other lands, are turning their attention to its care, in the conviction that when proper attention and skill are devoted to the object, and when the sheep are hurdled and fed on the hill tops, and kept clear from scab, which has hitherto been entirely disregarded in the colony, mutton and wool will be remunerative even in these lower localities. At any rate, mutton, which was never seen on the tables at Maritzburg three or four years since, is now regularly supplied by the butchers in unlimited quantity at sixpence per pound. In the year 1861 about 650,000 pounds of sheep's wool, worth £33,000, was exported from Natal; much of it, of course, being the produce of the Overberg states. There are samples of Umvoti-grown wool, furnished by Mr. G. Baker, of Maritzburg, a gentleman who has given much attention to the improvement of sheep farming in the colony. There are also samples from the Nodesberg; from Richmond, twenty miles south of Maritzburg; from the hills immediately above Maritzburg; from the heights between the Umgeni and Mooi rivers; and from the banks of the Mooi river, forty miles north of Maritzburg.

There is another large group of herbivorous ruminants which is of great interest in Southern Africa, on account of the meat it affords and of the spoils it yields. This is the family of the antelopes, or bucks, as they are more familiarly called by hunting men. The flesh of the antelope is the venison of South Africa, and many forms of this venison are still common enough in Natal, although as the ruminants of civilization, oxen and sheep, increase in a land, the antelopes observe the inverse proportion, and diminish in number. The antelopes constitute the herds of the wilderness. The spring buck, which yields the mat and caross, is the beautiful leaper of the high plains; it does not descend into Natal, but exists on the more elevated grounds in countless numbers. These antelopes have received their name from the habit of leaping perpendicularly upwards of six or seven feet when alarmed, showing, in the act, remarkable snow-white folds of skin which run from the middle of the back to the tail. The Dutchman of South Africa draws upon the skin of this animal for his carpets. The pallah, or roode buck (red buck), also confines itself to the upper regions beyond the Berg; it is a beautiful animal, standing three feet high, with irregular, lyrate-ringed horns. It is a sort of first cousin of the spring buck, occasionally leaping in the same way when excited, but generally not more than six or eight individuals are found in company. The orebi, whose horns are shown, is a red animal, weighing about thirty pounds, and somewhat resembling the hare in its habit of squatting close upon the ground, and starting up almost under the horse's feet. It runs in circles, and dwells on the open plains. It is spread all over the colony of Natal. The duiker buck is a dark grey antelope, somewhat smaller than the orebi, which affects the habits of the rabbit rather than of the hare, lives in cover, and runs into the open when started from its shelter. It receives its name from its habit of diving into the foliage where it lurks. It, too, is abundant in Natal. The small blue buck is a very beautiful little creature, of a grey

colour, and not much larger than a good-sized hare. It dwells in the thick bush, and is abundant throughout the wild covers of the colony. It is well named the *Cephalopus pygmaea* by learned men. The ree buck is the chamois of South Africa, and is found in plenty on the Natal hills, where it places sentinels, and is difficult to surprise. It runs along the hill sides with a swift gliding motion, altogether different from the bounding gait of most of its fraternity. The reed buck is a fawn-coloured animal, of considerable size, weighing from eighty to one hundred pounds, and haunting swampy covers of reeds and high grass, either on the banks of running streams, or in the beds of exhausted water-courses. It is a slow runner, and squats until the hunter is near, and therefore is considered easy game. It is common in Natal. The red bush buck is a bright red-bay antelope, which frequents the dense bush-covered ground of the coast.

The spring buck, pallah, ourebi, duiker buck, blue buck, ree buck, reed buck, and red bush buck are all true antelopes; that is to say, they are slim, graceful animals, of great lightness and symmetry. The stag antelopes, on the other hand, have heavy bodies and larger dimensions, and commonly carry a considerable development of horn. Of these, five species are found on the high plains to the north of Drakensberg, but not in Natal. The water buck, or kringat buck, lives upon the banks of the larger rivers, and seeks safety when disturbed by rushing through them to the opposite bank. The blue buck is an antelope of the high plains, with a black skin seen shining through ashy-grey hair, with large recurved horns, and with a body six feet long. The sable antelope, Zwartwitpens buck, is a very beautiful beast, with a black body and white belly, and with a white face streaked with black. The gems buck (*Oryx gazella*) is a renowned warrior; perhaps the most gallant combatant of his tribe. With his formidable straight horns he defends himself bravely whenever he is attacked, and has been known to beat off even the lion upon occasions, whence he has earned for himself the familiar sobriquet of "lion killer," by which he is extensively known. His first-cousin, the oryx, or *Oryx leucoryx*, is scarcely less beautiful, and in one particular as renowned as himself. It is believed to be the unicorn of the Egyptian monuments.

Of the bovine, or ox-antelopes, still more bulky than the stag-antelopes, four are seen in Natal. The hartebeest, is a magnificent animal, weighing as much as three hundred and fifty pounds, which inhabits the open plains, where it grazes, and runs hard when disturbed, having first taken a fair and cool gaze at its antagonist. The hartebeest comes, in winter time, within five hours' ride of Maritzburg, and may always be seen at that season on the Umvoti flats; the bastard hartebeest is only encountered in the high Karoos. The bless buck, so called from having a white blaze down its body, is met with in Natal, just beneath the Drakensberg, in the three coldest months of the year, and then almost always has the lion in attendance. The bush buck, or bush ram, is a Natal buck, of about the same size as the reed buck. It lives under cover, and shows fight when it is brought to bay, barking like a dog, and not unfrequently proving itself a formidable antagonist from the length and strength of its horns. The hartebeest, fine as it is, is altogether eclipsed by another species of this bovine family, which comes down the Berg into the uplands of Natal in the cool months of July and August—this is the eland. The eland is a heavy feeder, and enjoys a dignity of its own among the antelopes, in its habit of growing fat. A full-grown bull will sometimes weigh as much as a thousand pounds, and falls with a crash when it is struck by the hunter's lead. The fat eland is naturally a slow runner; what it gains in portliness it necessarily loses in agility and speed. The Dutch hunter avails himself of this peculiarity in making the slow creature carry its own ponderous weight to the larder. He leisurely trots his game before him until he is in the neigh-

bourhood of his homestead, and then brings it to the ground. There is a slight spiral twist in the horns of the eland, which are more remarkably developed in another antelope nearly allied to the eland, but never seen in Natal. This is the unquestionable prince of the tribe. The koodoo does not fatten like the eland, but it stands four feet high and is eight feet long. It has the stature of a little horse. It is a good swimmer, and lives upon the banks of the large upland rivers. The horns are four feet long, and twisted through two spires and a half. They are so heavy that they are usually carried couched along the back when the creature is in motion.

The horse antelope, the wildebeest, or gnu, is seen in the Overberg plain, in herds of countless numbers, coursing along in single file, and plunging and kicking, with its tail extended in the wind. This curious creature, which combines the dilated nostril and flowing mane and tail of the horse with the horn and cleft hoof of the ox, is the armorial emblem of Natal. On this account it is a pity that it does not combine the ovine wool as well as the bovine horn, with the horse hair. It then might have been hopefully looked to as a Natalian augury as well as a Natalian emblem. The zulu wildebeest differs considerably from the wildebeest of the Dutch free states.

The giraffe is now never seen, except far up in the interior. The only appearance it enters in Natal is the thick camel leather which it sends down for the soles of Dutchmen's shoes, an article that belongs, however, to manufactured substances rather than raw material.

The thick skinned, non-producing group of quadrupeds is unquestionably next in importance to Natal in a commercial and economical point of view. The elephant is still plentiful in the thick wild bush along the Tugela, and is in great force in the land beyond the Drakensberg, whence he still sends down his spoils in abundance. It is only upon very chance occasions he strays nearer to white settlers, and when he does so, is quite sure to get an immediate notice to quit. In the year 1861 seventy-five thousand pounds of ivory, worth nearly twenty-three thousand pounds sterling, was shipped from Natal. The bull-tusks exhibited by Messrs. Dickinson Brothers, of Natal, are fine specimens of their class. The tusk exhibited weighs 126 English pounds, and is the largest specimen that came down to Natal during the past year. The rhinoceros is only seen about the banks of the inland rivers; but it must still be very plentiful, to judge from the number of its horns that enter the colony. Every store abounds with specimens of them. Twelve hundred horns, worth six hundred pounds sterling, are exported annually from Natal. Very fine specimens of the horn of the black rhinoceros are shown. Most of the African rhinoceroses have two horns arranged as in the one double specimen exhibited. The horns are solid appendages, and are fixed upon strong arches of bone provided for their attachment; the foremost upon the nasal bones, and the hindmost upon the frontal bone. The rock rabbit (*Hyrax capensis*), probably identical with the cony of scripture, is a curious little animal, half packyderm, half rodent, which lives in families in the crevices of rocks, and feeds upon herbage and young vegetable shoots (*Phacochæres*). The African wild boar is a large animal living in the bush, and occasionally weighing as much as 180 pounds. It very much resembles the wild boar of Europe. A smaller pig, known as the prairie pig, is only found in the open veldt; it is a more active animal, and much valued for pork. The sea-cow or river horse (hippopotamus), half-elephant, half-pig, is still abundant in many parts of the colony. There are preserves of it within an easy ride of both Maritzburg and Durban. Its tusks furnish a very valuable kind of ivory. The quagga (wild ass), the South African representative of the solid-hoofed packyderm, and the zebra, come down the Drakensberg into the Natal uplands, with the bless buck and the wildebeest, during the three coldest months of the winter, when the higher plains are without herbage. The horse is, of course, bred with considerable care in Natal. Of late

years its value has been greatly enhanced by improved breeding, as well as by the prevalence of epidemic lung diseases at certain seasons. The higher grounds are considered to be the least liable to its ravages. There are spots in the colony which have hitherto escaped the visitation. Large troops of horses are continually supplied to Natal from the Dutch states. Forty-eight horses have been exported from Natal in the last two years.

The carnivora are numerous in Southern Africa; but by universal consent of white settlers are held to be minus quantities, rather than plus, in the economical and commercial account, notwithstanding the large prices that are now obtained in the market for their beautiful skins. They are very unmanageable and unreasonable in the matter of diet. The head of a lion exhibited exemplifies this, for during a brief visit at the close of last year to the neighbourhood of Pretoria, in the Transvaal States, he slaughtered seven oxen without asking the leave of the owners. He was retributively shot by a spring-gun, baited with the remains of one of his victims. This head belonged to a maneless variety of great ferocity, not uncommon in the Transvaal States. The black-maned lion is a comparatively gentle and gentleman-like beast, and more easy to entertain. The lion is still abundant in the Transvaal States, and comes down into the remote upland of Natal in mid-winter with the herds of quaggas, wildebeests, and bless bucks that are then driven by thousands to seek pasture under the Drakensberg. Upon rare occasions some extraordinarily enterprising individual pushes a rapid raid through the more settled districts, levying a passing tribute, and returning to the mountains, if not intercepted, in its retreat. The panther and leopard are more commonly encountered in Natal. They occasionally make for themselves lairs in the inaccessible bush, whence it is exceedingly difficult to dislodge them, and drop upon animals passing beneath the trees where they lurk, or visit neighbouring herds by night. They too, are, however, much less abundant than they are beyond the frontier. All varieties of the leopard are "tigers" among the Dutch. The tiger cat is found all over the colony, as well as beyond the Berg. The grey cat (*Chaus silveus*, Isingquai of the Kafirs), is probably the chaus caffre, a kind of lynx; the rooi cat of the Dutch is undoubtedly a lynx (the *Caracal melanotis*); the silver jackal is a fox (the *Vulpes caama*). The skins of all these animals are highly valued by the Kafirs, as articles of ornament and dress; and deservedly so, for they are very beautiful objects. Many of them fetch higher prices in the Kafir market than they do in the white settlers' stores below. The carosses formed from the skins of these animals are manufactured by some of the native tribes of the interior, and are admirably prepared. The inner surface of the skin is cleaned by elaborate rubbings with a kind of clay, or fuller's earth, and all the rents in the fabric are carefully pieced with suitable fragments; the skins are sewn into the caross by the tendons of animals. The Kafirs have a gaunt ugly breed of dogs, which they employ in the chase; most probably a cross with the wild hunting dog of the prairies (*Lycan pictus*). There are several kinds of hyenas in the colony, all "wolves" among the Dutch, and all persecuted, perhaps more than they deserve to be, if due consideration be given to their scavengerial services. The otter is found on the banks of the rivers. Of the civet tribe, the Umhlangwane and Umvuzi of the Kafirs are ichneumons; the insimba is a musk-cat; the toothless insectivore (*Edentata*), have in Natal the isinkwe of the Kafirs, which is a lemur; the scaled manis, or pangolin, and the great furry ant bear, which is very common, as most horsemen can testify to their cost, the ground being in many places literally honey-combed by its burrows, although the creature is very rarely seen, on account of its nocturnal habits.

Among the rodents, the ubiquitous mice and rats are, of course, found in Natal in due plenty. There is a kind of dormouse, which makes itself very much at home in houses, and which would be very interesting if it were

less meddlesome and destructive. The porcupine is seen not uncommonly. The ivondwe of the Kafirs is the ground rat (*Aulacodus Swinderianus*), a member of a subdivision of the porcupine tribe, which is gaining for itself an unenviable species of notoriety, on account of its fondness for sugar cane.

The ostrich is still encountered in large flocks on the high inland plains north of the Drakensberg. It is only seen in Natal when it marches down by the side of some ox waggon, on its way to a life of captivity in England. The feathers of the ostrich are constant exports. In the year 1861, one hundred and ten pounds, worth £564 sterling, were shipped by the merchants of Natal.

(To be continued).

ELECTRIC ENGRAVING MACHINE.

This machine, shown in class VII. of the International Exhibition,* is used for engraving the cylinders of copper or brass, employed in the printing of woven fabrics and paper hangings.

Its great distinctive feature—apart from its general mechanical arrangements—is in the application of voltaic electricity in communicating certain necessary movements to important and delicate portions of the apparatus.

The cylinder to be engraved is first coated on its outer surface with a thin film of varnish, sufficiently resistant to the continuous action of the strongest acids. The requisite number of copies of the original design are then traced or scratched simultaneously by a series of diamond points which are arranged on the machine, parallel with the axis of the cylinder. Each diamond point is in correspondence with a small temporary magnet, and the entire series is so arranged *en rapport* with the original design, which had been previously etched on a metal cylinder filled in with a non-conducting substance (this cylinder being made to revolve in contact with a tracing point), that when the electric current passes, intermittent currents are established, whereby the diamonds are withdrawn from their work at the proper intervals. The metallic surface is thereby exposed in certain parts, and a bath of nitric or other acid being afterwards used to etch or deepen the engraved portion, the operation is completed.

Amongst other special advantages said to be derived from the use of this apparatus, the facility with which engravings may be enlarged or diminished to any necessary extent from the same original, is not the least important.

SOCIETY OF SCULPTORS OF ENGLAND.

At a meeting recently held at the rooms of the Architectural Society in Conduit-street, James Edmeston, Esq. in the chair, the following resolutions were passed:—

"That a society be formed to be called the Society of Sculptors of England, which shall have for its objects—

1. To exhibit annually the works of its members.
2. To include amongst its members not only professional sculptors, but also amateurs, patrons, and well-wishers of art; and
3. To correspond with other Societies interested in the welfare of art, from whom some substantial assistance may be expected."

"That the Society consist of a president, vice-presidents, council, and members, with honorary secretary, treasurer, and auditors; and that the Council be authorised to enrol members and to settle the rules of the Society. The subscription to be fixed at one guinea per annum."

The reasons given by the promoters for the formation of this Society are, "that there are few places in London where sculptors are afforded the opportunity of exhibiting

* Messrs. York and Co., Proprietors.

annually the products of their skill. The Royal Academy, the South Kensington Museum, and small spaces in the British Institution and Suffolk-street Galleries comprise the whole. The painters are splendidly lodged, the architects have their Institution, but the sculptors who really ought to hold the first rank in the fine arts, are condemned to a comparative obscurity, and generally speaking their productions are to be found in their studios, instead of the places to which their merits should entitle them. This neglect might have been tolerated years ago, when the number of sculptors in this country was comparatively limited, but now that they may be reckoned by hundreds, and the patrons and lovers of the art by thousands, it is high time that sculptors should take a step in the right direction, and by asserting their independence as a body entitled to an annual exhibition of their own, to offer on the one hand to the aspiring artist that opportunity of displaying his talents which he has for years ardently but vainly desired; and on the other, to open up to all classes of the community the means of obtaining works of art, of a sterling character, at a moderate expense.

"By thus entering into friendly rivalry, and subjecting their works to the test of public criticism, great advantages would accrue not only to the sculptor himself, who would be encouraged in the pursuit of his high vocation, but also to society at large, whose taste would thereby receive further development, being led by new paths to the contemplation of objects embodying the first principles of beauty, sublimity, and truth."

It is proposed to open an Exhibition on or before the 1st of April, 1863, which is to continue open for three months.

EXAMINATION PAPERS, 1862.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(Continued from page 609.)

LOGIC AND MENTAL SCIENCE.

THREE HOURS ALLOWED.

All candidates should attempt six Logic questions, answering a part at least of question No. 4; and three questions in each of the other books which they have studied.

LOGIC.

1. Explain univocal, equivocal, and analogous nouns, with examples.
2. Is logic an art or a science? Give your reasons.
3. Define the following words, mentioning in each case the kind of definition employed:—Music, right, fortress, idleness, oxygen, art.
4. Draw out in proper form the following arguments, and examine their correctness:—

- (a) If virtue is voluntary, vice is voluntary; virtue is voluntary, therefore so is vice.
- (b) Warm countries alone produce wines; Spain is a warm country, therefore Spain produces wines.
- (c) There will be no dew, for the night is too cloudy.
- (d) Gold and copper are very ductile, therefore this is a property of all metals.
- (e) Arsenic is a poison, therefore it ought not to be used in medicine.
- (f) What happens daily is probable; now, most unlikely things happen every day, therefore they are probable.
- (g) Harvey might expect to be persecuted for his discovery of the circulation of the blood, because Galileo was for his discovery.
- (h) A question cannot be a logical proposition, for it does not affirm or deny.

- (i) He committed the murder, for he had a gun in his hand, lately discharged, and was near the place, and quarrelled with the murdered man last week.

5. What is abstraction? Can there be abstraction without generalisation?
6. In what way does language abridge the process of thinking?
7. Show that Induction and Example are really syllogistic.
8. What faults of thinking does Logic profess to guard against, and what does she decline as beyond her range?
9. Explain the various kinds of Definition. When is it permissible to use the less perfect kinds?
10. Can inferences be drawn from one proposition? What can we infer from "All gases are compressible."?
11. What are hypothetical propositions? Can you show how they resemble categorical propositions?
12. What is the argument from analogy? Give one or two examples.
13. Mention some of the principal fallacies.

PALEY'S MORAL PHILOSOPHY.

1. It is not useful, and therefore it is not right, to rob a miser and give his money to the poor. Prove this.
2. What are the public benefits of the institution of property as to plenty, peace, and convenience?
3. What kinds of promises are not binding? Illustrate with examples.
4. Prove the unlawfulness of drunkenness on Paley's principles.
5. What is the theory of a "social compact," and what are the errors in it? What is Paley's own theory of civil government?
6. How does Paley reconcile the search after what is expedient with obedience to the will of God? What is the presumption, or postulate, by which the two are reconciled?
7. What are the objections usually brought against Paley's system?

BISHOP BUTLER'S SERMONS.

1. What is the distinction between the power and the authority of a principle?
2. What rules does Butler give for the control of the tongue?
3. "Hobbs defines pity as the imagination of calamity to ourselves, proceeding from the sight of another man's calamity." What is the fallacy of this view?
4. How is it shown that self-love and love of our neighbour are not necessarily irreconcilable?
5. Give a short sketch of the system of morals in Butler's Sermons.
6. Analyse briefly the Sermons on Human Nature.
7. Compare Butler's system with any other with which you are acquainted.

STEWART'S PHILOSOPHY OF THE HUMAN MIND.

1. How far do a man's "habits of thinking" influence the laws of association of ideas in his mind? Give illustrations.
2. What account does Stewart give of systems of "Artificial Memory?"
3. "The apparent coldness and selfishness of mankind may be traced in a great measure to a want of attention and a want of imagination." Explain this.
4. What are the principal uses of the study of the Philosophy of the Human Mind? State from your own knowledge the common objections to the study.
5. What is the connexion between memory and the association of ideas?
6. Give a short account of Nominalists, Realists, and Conceptionalists, from Stewart's work.

BACON'S NOVUM ORGANUM.

1. What is Bacon's purpose in this work?

2. What are the *idols of the mind* of which he complains?
3. What is Bacon's estimate of ancient philosophy, as gathered from the *time* when it took its rise, the *effects*, the *progress*, the *confessions of the authors*, and the *discord amongst them*?
4. What encouragement does Bacon draw from obvious inventions that have been overlooked until the inventor appeared? Give examples of such inventions.
5. "Nature is only subdued by obeying her; and that which in contemplative philosophy corresponds with the cause, in practical science becomes the rule." Explain this.
6. How does Bacon describe the right and the wrong ways of investigating truth?

LATIN AND ROMAN HISTORY.

THREE HOURS ALLOWED.

SECTION I.

Translate—

Nil me fatalia terrent,
Si qua Phryges prae se jactant, responsa deorum.
Sat fatis Venerique datum, tetigere quod arva
Fertilis Ausoniae Troes. Sunt et mea contra
Fata mihi, ferro sceleratam excindere gentem,
Conjuge praecepta; nec solos tangit Atreidas
Iste dolor, solisque licet capere arma Mycenis.
Sed periisse semel satis est. Peccare fuisset
Ante satis, penitus modo non genus omne perosos
Femineum. Quibus haec mediis fiducia valli
Fossarumque morae, leti discrimina parva,
Dant animos.—*Aeneid*, ix., 133-144.

1. Parse (giving both *accidence* and *syntax*), *fatis*, *fertilis*, *conjuge*, *solis*, *genus*, *quibus*, *fossarum*, *discrimina*.
2. Conjugate the verbs to which belong *datum*, *tetigere*, *excindere*, *praecepta*, *licet*, *capere*, *periisse*, *dant*.
3. Decline *deorum*, *Veneri*, *gentem*, *dolor*, *omne*, *haec*, *fiducia*.

SECTION II.

Translate—

At subitus miseræ calor ossa relinquit;
Excussi manibus radii revolutaque pensa.
Evolat infelix, et femineo ululatu,
Scissa comam, muros amens atque agmina cursu
Prima petit, non illa virum, non illa pericli
Telorumque memor; cælum dehinc questibus implet:
"Hunc ego te, Euryale, adspicio? tunc ille senectæ
Sera meae requies, potuisti linguere solam
Crudelis? nec te, sub tanta pericula missum,
Affari extremum miseræ data copia matri?
Heu, terra ignota canibus date præda Latinis
Alitibusque jaces! nec te in tua funera mater
Produxi, pressive oculos, aut vulnera lavi,
Veste tegens, tibi quam noctes festina diesque
Urgebam et tela curas solabar aniles."—*Aeneid*, ix., 475-489.

1. Give the government of *miseræ*, *comam*, *pericli*, *questibus*, *tibi*, *teld*.
2. Parse (giving the *accidence* and *syntax*), *ossa*, *manibus*, *agmina*, *requies*, *solam*, *date*, *veste*.
3. Conjugate the verbs to which belong *excussi*, *revoluta*, *petit*, *linguere*, *missum*, *produxi*, *pressi*, *lavi*, *tegens*.

SECTION III.

Translate—

Et quis homo? quamquam nullam nobilitatem, nullos honores, nulla merita cuiquam ad dominationem pandere viam; sed tamen Claudios Cassios consulatibus decemviratibus suis majorumque honoribus splendore familiarum sustulisse animos, quo necesse fuerit: Spurius Maelium, cui tribunatus plebis magis optandus quam sperandus fuerit, frumentarium divitem, bilibris farris sperasse libertatem se civium suorum emisse, ciboque obijciendo ratum victorem finitimorum omnium populum in servitutem perlicui posse, ut quem senatorem concoquere civitas vix posset,

regem ferret, Romuli conditoris, ab diis orti, recepti ad deos, insignia atque imperium habentem. Non pro scelere id magis quam pro monstro habendum, nec satis esse sanguine ejus expiatur, nisi tecta parietesque, intra quæ tantum amentia conceptum esset, dissiparentur bonaque contacta pretiis regni mercandi publicarentur.—*Livy*, iv. 15.

1. Parse (giving the *accidence* and *syntax*), *nobilitatem*, *consulatibus*, *divitem*, *farris*, *ratum*, *Romuli*, *scelere*, *amentia*.
2. Conjugate the verbs to which belong *sustulisse*, *emisse*, *obijciendo*, *pellici*, *concoquere*, *recepti*, *habendum*, *contacta*.
3. Why is *pandere* in the infinitive mood? and why *fuerit* in the subjunctive?

SECTION IV.

Translate—

Transierat ex re bene gesta superbia neglegentiaque ad Aequos, quæ in Romanis ducibus fuerat. Itaque primo statim proelio cum dictator equitatu immisso antesignanos hostium turbasset, legionum inde signa inferri propere jussit, signiferumque ex suis unum cunctantem occidit. Tantus ardor ad dimicandum fuit, ut impetum Aequi non tulerint, victique acie cum fuga effusa petissent castra, brevior tempore et certamine minor castrorum oppugnatio fuit quam proelium fuerat. Captis direptisque castris cum prædam dictator militi concessisset, secutique fugientem ex castris hostem equites renuntiassent omnes Labicanos victos, magnam partem Aequorum Labicos confugisse, postero die ad Labicos ductus exercitus, oppidumque corona circumdata scalis captum ac direptum est.—*Livy*, iv., 47.

1. Parse (giving both *accidence* and *syntax*), *re*, *ducibus*, *equitatu*, *legionum*, *impetum*, *acie*, *certamine*, *militi*, *Labicos*, *scalis*.
2. Conjugate the verbs to which belong *transierat*, *immisso*, *inferri*, *occidit*, *tulerint*, *effusa*, *direptis*, *concessisset*, *ductus*.
3. Decline *hostium*, *tempore*, *equites*, *partem*, *die*.

SECTION V.

1. Describe the Roman plebs.
2. What led to the Institution of the Tribune? In what consisted the great power of that office?
3. What was a Roman colonia? Mention some of the earliest, and the purpose for which each was founded.
4. Give an account of the Second Samnite War.
5. Narrate the successive changes in the Roman laws concerning debt.
6. What effect had the irruption of the Gauls on the history of Italy?

SECTION VI.

1. What led to the first Punic War? and what were its results?
2. Give an account of Publius Scipio Africanus.
3. What effect had the existence of slavery among them on the people, the government, and the history of Rome?
4. Give an account of the Gracchi.
5. At what time was Greek literature first introduced into Rome? What authors distinguished themselves by imitating or reproducing it?
6. Give an account of the first Triumvirate.

(To be continued.)

Proceedings of Institutions.

LEEDS YOUNG MEN'S ASSOCIATION.—The sixth annual report of this Association says:—The number of subscribers has been 400, of whom 200 were members of the Association. As at least 500 subscribers are necessary to render the Institution self-supporting, it is hoped the subscribers generally will assist the Committee in attaining so desirable a result. Consequent upon the frequent change of residence in the class from which its ranks are

chiefly recruited, a large annual accession of new subscribers is absolutely requisite to maintain its present position. From the foregoing statement it will not be matter of surprise that the Society is considerably in debt. Having a due regard to the efficiency and comfort of the subscribers, the Committee cannot recommend any important reduction in their present expenditure. The extra annual income required to place the Association in a sound financial position is so small, that the Committee are satisfied the appeal will not be in vain when the position and claims of the Society are fully known and appreciated. A few months ago it was determined to admit ladies to the library and lectures on payment of a small annual subscription; and it is hoped a large accession of lady subscribers will justify the wisdom of this arrangement. The library contains upwards of 1,500 volumes, 80 having been added by purchase and donation during the past year. The latest works published are obtained from W. H. Smith and Son's library, for temporary circulation. The issues during the year amount to 6,000, an evidence of the value of this important agency in the estimation of the subscribers. The Committee are anxious to increase the efficiency of this department by larger additions, especially of works of reference. Donations for this special object are invited. A classified catalogue is in preparation. Several magazines and newspapers have been added to the list, and the news-room is now well supplied with periodical literature. The following public lectures have been delivered in the Stock-Exchange Hall, under the auspices of the Society:—"John Wesley; a Presbyterian's Sketch of the Methodists," Rev. Dr. Archer, London. "The Triumphs of Self-education; illustrated by examples," Rev. J. Baker, Pontefract. "Life and Times of Crammer," Rev. J. Bardsley, M.A., Liverpool. "Rome," Rev. J. Blomefield, M.A., Leeds. "Music,"—with illustrations—Rev. Dr. Brewer, Leeds. "The Seventh Commandment," Rev. W. Brock, London. "The Insect World, a Testimony of God," Rev. J. D. Brocklehurst, Leeds. "Jerusalem,"—illustrated—J. Hammond, Esq., LL.B., Leeds; two lectures. "Japan and the Japanese,"—illustrated—Dr. Macgowan, London; two lectures. "Luther and Loyola, a Parallel and a Contrast," Rev. M. Miller, Heywood. "Dominoes; or, Keeping up Appearances at Home, Abroad, in the Schools, and Churches," Rev. J. B. Owen, M.A., Chelsea. "The Materials of which Men are Made, with a few Specimens from the Factory," Rev. F. J. Sharr, Liverpool. Electricity; the Induction Coil"—with experiments—E. Wheeler, Esq., C.E.; two lectures. The audiences have been larger than in any previous year, and the lectures have been exceedingly interesting and instructive. The valuable services of the lecturers, in every case so cordially rendered, are gratefully acknowledged. The following educational classes, containing about 100 pupils, have been in successful operation:—Mathematics and Physics; French; German; Book-keeping; Short-Hand; Reading, Writing, Arithmetic, and Grammar. At the Society of Arts' Examination, last year, a prize of £1 was presented by the Committee of the Institution to each holder of a first-class certificate. The annual *soirée* held in the music-hall, under the presidency of G. S. Beecroft, Esq., M.P., was of an interesting and successful character. In addition to the distribution by the chairman of the prizes and certificates awarded by the Society of Arts, the meeting was addressed by E. Baines, Esq., M.P., and other gentlemen. The Society has, during the year, sustained a serious loss in the lamented death of its esteemed treasurer, Thomas Edward Plint, Esq., to whose judicious counsel and liberal support it owes much of its success.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, August 22nd, 1862.]

Dated 15th April, 1862.

1090. T. W. Gray, 114, Fenchurch-street—Imp. in the manufacture of explosive compounds. (A com.)

Dated 21st April, 1862.

1153. E. H. C. Monckton, 5, Thurlow-place, South Kensington—Imp. in the preparation of metal to be used in the construction of cannon, rifles, armour plates, and other objects used in naval or military warfare or otherwise.

Dated 22nd April, 1862.

1167. E. H. C. Monckton, Thurlow-place, South Kensington—Imp. in umbrellas, parasols, awnings, tents, and covering cloths, and in waterproofing the same.

Dated 23rd April, 1862.

1184. A. Hodgkinson, Belfast—A mixture or composition to be used in the process of boiling, preparing, or bleaching vegetable substances, whether they are in the manufactured or unmanufactured state, which mixture may also be used in the manufacture of soap.

Dated 13th June, 1862.

1766. J. Robinson, Rochdale—Imp. in machinery or apparatus for sawing wood.

Dated 28th June, 1862.

1902. James Petrie, Rochdale—Imp. in slide valves for steam engines

Dated 15th July, 1862.

2032. E. Draper and E. Thomas, Birmingham—A new or improved method of strengthening wooden shutters and doors.

Dated 18th July, 1862.

2051. J. Willcox, 89, Chancery-lane—A new ornamental fabric, and the machinery for producing the same. (A com.)

2053. F. L. Stott, Rochdale—Imp. applicable to mechanism or apparatus for warping yarns or threads.

Dated 22nd July, 1862.

2083. R. Crogan, 22, Westbourne-gardens, Bayswater—Imp. in screw propellers of steam vessels, and in the arrangement thereof.

Dated 23rd July, 1862.

2093. C. J. Keene, 10, Shrewsbury-villas, Bayswater—A new or improved winding apparatus for raising and lowering canvas on easels.

2095. E. K. Dutton, Stretford, Lancashire—Certain imp. in steam-engines.

2097. W. Clark, 53, Chancery-lane—Imp. in the manufacture of manure. (A com.)

2099. R. Bell, Westland-row, Dublin—Imp. in the manufacture of bricks. (A com.)

Dated 24th July, 1862.

2101. J. Dickson, 66, Tollington-road, Holloway—Imp. in treating copper ores and solutions of copper to obtain copper therefrom.

2103. W. Clissold, Dudbridge, Gloucestershire—An improved mode of manufacturing cylinders.

2105. T. Lemaistre, Paris, 3, Rue de Grammont—Imp. in privies.

2107. W. H. Perkin, Seymour-villa, Sudbury—Imp. in printing and dyeing when aniline and analogous coal tar dyes are employed, also in preparing colouring matters. (A com.)

Dated 25th July, 1862.

2111. J. Redgate, Sneyton, Nottinghamshire, and H. Redgate, Stoney-street, Nottinghamshire—Imp. in machinery or apparatus for the manufacture of fabrics on bobbin net or twist lace machines.

2113. P. Robertson, Glasgow—Imp. in producing brushing or frictional surfaces.

2115. J. Seymour, Queenstown, Cork, and D. G. Hatcher, Southampton—Imp. in steering ships, and in apparatus for the same.

2117. V. Manzini, Modena, Italy—Certain imp. in the construction of locomotive engines used on railways for facilitating and controlling the ascent and descent of locomotive engines and trains on inclined planes of lines of railway, and for simplifying the construction of locomotives used on railways.

2119. A. Lahousse, Lupus-street, Fimalco—An improved construction of railway wheel.

Dated 26th July, 1862.

2121. T. Sagar and J. Rocliff, Burnley, Lancashire—Imp. in moulding.

2123. W. Clark, 53, Chancery-lane—Imp. in obtaining or extracting silver from ores and other bodies, and in apparatus for the same. (A com.)

2125. T. Long, 2, Clarendon-place, Notting-hill—Imp. in the manufacture of open metal work, applicable to various useful purposes.

Dated 28th July, 1862.

2130. W. Spence, 50, Chancery-lane—Imp. in the preparation of a red colouring matter. (A com.)

2131. P. S. Devlan, Manchester—Certain imp. in the manufacture of telegraphic cables.

2132. W. Spence, 50, Chancery-lane—Imp. in the preparation of a blue colouring matter. (A com.)

2135. T. Cook, Manor-place, Waltham—Imp. in apparatus employed in the manufacture of envelopes.

2137. J. Fourdrinier, Grove-terrace, Peckham—Imp. in apparatus for removing knots from pulp.

2139. F. Selby, Surbiton, Surrey—Imp. in surface condensers.

2141. E. Burnett, Ashford, Kent—An improved combined cart and sleigh.

2143. C. W. Siemens, 3, Great George-street, Westminster—Imp. in gas engines.

Dated 29th July, 1862.

2145. Z. Colburn, 15, Tavistock-street, Bedford-square—Imp. in steam pumping engines.

2147. A. Boyle and T. Warwick, Birmingham—Imp. in the manufacture of the ribs and stretchers of umbrellas and parasols, and in machinery to be employed in the said manufacture.
2149. P. S. Devlan, Commercial-street, Manchester—An improved composition to be employed for covering projectiles and the internal and external surfaces of vessels, which is also applicable to the manufacture of tubing and to other useful and ornamental purposes.
2151. G. T. Burgess, Brentwood, Essex—An improved stand for beer and other casks.
2153. J. Mapple, 2, Newman's-place, Kentish Town, and D. Mapple, 3, Queen's-road, Homerton New Town—Imp. in telegraphic apparatus.
2155. M. Henry, 84, Fleet-street—Imp. in obtaining fibrous materials and paper pulp, in treating, cleansing, and scouring fibrous materials and fabrics manufactured thereof, in producing soap for the said operations, and in obtaining products from liquors used therein. (A com.)

Dated 30th July, 1862.

2159. J. Hyde and J. Hyde, Bradbury, Chester—Certain imp. in governors for steam engines, water wheels, mills, and for other similar purposes.
2163. J. Benyon, Swinton, near Manchester—Certain imp. in looms for weaving.
2165. W. Clark, 53, Chancery-lane—Imp. in gas burners. (A com.)
2169. J. W. Woodford, Sutherland-street, Walworth—Imp. in machinery for raising or forcing water.

Dated 31st July, 1862.

2171. W. Weild, Manchester—Imp. in machines for cutting, shaping, rolling, drilling, screwing, milling, and fluting metals.
2173. C. Bedells, Leicester—Imp. in the manufacture of braces.
2175. A. V. Newton, 66, Chancery-lane—Improved machinery for planing metal. (A com.)

Dated 1st August, 1862.

2177. J. List, Carisbrooke, Isle of Wight—An improved means of and instruments for obtaining distances and heights, and distances between distant objects, without computation.
2179. D. T. Lee, Birmingham—An imp. or imps. in ornamenting surfaces of wood and of papier mache.
2181. G. A. Biddell, Ipswich—Imp. in railway crossings.
2187. T. G. Webb, Manchester—Imp. in the manufacture of flint glass.

Dated 2nd August, 1862.

2189. J. Briggs, Blackley, Lancashire—Imp. in the manufacture of belts, webs, braids, tapes, laces, and other similar articles produced by weaving, plaiting, or twisting.
2193. G. Coles, Gresham-street West, and J. A. Jaques and J. A. Fanshawe, Tottenham—Imp. in the manufacture of grinding and polishing tools and surfaces.

Dated 4th August, 1862.

2194. A. Denny and E. M. Denny, Waterford, Ireland—Imp. in the manufacture of bacon.

Dated 5th August, 1862.

2195. S. Simon, Tuilerie-street, Hackney-road—An imp. in ornamenting ladies' and children's slippers.
2198. J. Townsend, Glasgow—Imp. in damping cotton and other fibrous materials and fabrics, in preserving the same from mildew, and in preserving size or stiffening from decomposition.
2199. W. Clark, 53, Chancery-lane—Imp. in the purification of water, and in apparatus employed therein. (A com.)
2201. J. R. Nicholl, Streatham, Surrey—Improved means of, and apparatus for, utilizing and disposing of the sewage of towns and villages.

Dated 6th August, 1862.

2203. W. W. Burdon, Newcastle-upon-Tyne—Imp. in reducing wood fibres to pulp.
2205. M. C. Sinibaldi, 1, South-villas, South-street, Greenwich—Imp. in the manufacture of chains, and in the apparatus employed therein.
2207. F. Nauheim, Cecil-street, Mile-end-road—An imp. in the ornamenting of boots, shoes, and goloshes.

Dated 8th August, 1862.

2222. J. Whipp, Rochdale—An improved arrangement of apparatus and means for cleaning articles of ornament and jewellery.
2224. R. A. Brooman, 166, Fleet-street—Imp. in repeating fire arms. (A com.)
2226. E. Humphrys, Deptford—Imp. in steam engines.

Dated 9th August, 1862.

2230. G. Hascltine, 100, Fleet-street—Imp. in carriage wheels. (A com.)
2234. A. J. Moreau and A. E. Ragon, Bernard-street, Russell-square—Imp. in the manufacture of gas and coke.

Dated 11th August, 1862.

2238. H. Fenton and W. Stubbs, Liverpool—Imp. in telegraph wires.
2240. J. Goodfellow, Blackburn—Imp. in steam or water engines.
2242. W. Clark, 53, Chancery-lane—An improved carriage for conveying sugar moulds in sugar refineries. (A com.)
2246. W. E. Gedge, 11, Wellington-street, Strand—Imp. in the construction of ladders. (A com.)
2248. H. Donald, Renfrew, N.B.—Imp. in machinery for shearing, punching, and riveting metals.
2250. R. Gresty, Packington-street, Islington—Imp. in scarfs or cravats.

Dated 12th August, 1862.

2254. J. Dickson, 66, Tollington-road, Holloway—Imp. in treating ores and solutions of lead to obtain lead therefrom.
2258. C. M. Westmacott, 42, Noble-street—Imp. in cements.
2262. C. Sengry, 54, Great Queen-street, Lincoln's-inn-fields—An improved smoking pipe, which may also be adapted as a tube for smoking cigars.
2264. J. Bower, Carlow—Imp. in railway sleepers.

Dated 13th August, 1862.

2266. J. Dickson, 66, Tollington-road, Holloway—Imp. in obtaining sodium from certain sources of that metal.
2270. C. W. Smith and W. Mould, Belmont, Lancashire, and S. Cook and W. H. Hacking, Bury—Imp. in looms for weaving.
2272. J. Peters, Wouldham-hall, Rochester—An improved hydraulic cement.
2274. G. Turner, Woolwich Dockyard—Imp. in fastening armour plates of ships.
2276. L. Galli, Lucca, Tuscany—Imp. in apparatus for propelling vessels.
2278. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in carts and other vehicles. (A com.)

Dated 14th August, 1862.

2282. J. Key and E. Hoskins, Birmingham—An imp. or imps. in the manufacture of plain and ornamental metallic pillars for bedsteads, cots, couches, tables, and other like purposes.
2284. C. E. Wilson, Monkwell-street—An imp. in buckle fastenings for braces and belts.
2288. H. R. Passey and L. Niman, 17, Little Newport-street, Leicester-square—An improved cigar tube or holder.
2290. W. J. Curtis, Tufnell-park-road, Holloway—An improved mode of, and apparatus for, ascertaining the fares and earnings of public vehicles.
2294. W. B. Herapath, 32, Old Market-street, Bristol—Imp. in decolorising solutions of sugar, and also vegetable juices containing sugar.
2296. W. B. Herapath, 32, Old Market-street, Bristol—Imp. in treating crystallizable sugar to render it more suitable for fermentation and conversion into alcohol and vinegar.

Dated 15th August, 1862.

2302. T. F. Kirby, Aldersgate-street—Imp. in garments for gentlemen and ladies' wear.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2298. M. A. F. Menons, 24, Rue du Mont Thabor, Paris—An improved apparatus for the production of sealing wax impressions. (A com.)—15th August, 1862.

PATENTS SEALED.

[From Gazette, August 22nd, 1862.]

<i>August 22nd.</i>	
471. W. H. Ross.	538. Sir C. T. Bright.
472. J. Kirkwood.	541. J. R. Foster.
473. A. Bornemann.	542. W. S. Wood.
476. C. H. J. W. M. Liebmann.	543. J. Revell.
480. G. Blakey, S. Blakey, J. Blakey, and B. White.	544. P. H. Azemar.
482. R. Foster, jun.	545. W. D. Muntz.
485. W. Johnson.	546. A. W. Makinson and W. F. Batho.
488. J. C. Haddan.	552. J. Parker.
489. R. Waller.	554. T. Bradford.
495. L. Davis and F. M. Parkes.	562. L. Vidie.
497. F. St. G. Smith.	690. S. V. Bonnetterre, C. T. Erhart, and J. F. Monti.
502. J. Piddington.	744. T. Myers.
504. E. Bliss and H. Lamplough.	783. W. A. Ashe.
506. T. Watson and R. Dracup.	866. E. T. Nouhalier.
512. C. Kingsford.	957. L. Lindley and F. Taylor.
514. H. W. Cook.	1020. E. Funnell.
516. A. Green.	1084. A. V. Newton.
517. A. Stephen, jun.	1124. G. T. Bousfield.
523. T. King and R. Vardill.	1189. W. E. Newton.
524. J. Cliff.	1231. S. Cheavin and G. Cheavin.
526. C. L. Knoll.	1248. J. E. A. Gwynne.
529. W. P. Savage.	1610. J. Critchley.
530. J. Medhurst.	1618. R. Griffiths.
531. J. Smith.	1733. J. G. Appold.
532. G. Torr.	1830. J. Taylor.
533. T. Adams.	1886. J. Lord.
536. W. Smith.	

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, August 22nd, 1862.]

<i>19th August.</i>	
1905. W. T. Henley.	1970. J. H. Johnson.
1914. G. W. Petter and T. D. Galpin.	1958. E. Rettig.
1915. W. A. Verel.	23rd August,
1944. M. J. Stark.	1933. J. Henry and J. E. H. Andrew.
20th August.	1950. C. Hanson.
1917. J. J. O. Taylor.	

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, August 22nd, 1862.]

<i>18th August.</i>	
1877. A. Savage.	23rd August,
	1921. C. Schlickeysen.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 5, 1862.

INTERNATIONAL EXHIBITION of 1862.
AWARDS OF MERIT.

The following circular has been issued; a copy will be furnished to any exhibitor on application to the Secretary of the Society of Arts.

Society for the Encouragement of Arts, Manufactures,
and Commerce,
John-st., Adelphi, London, W.C., Aug. 1862.

SIR,—The Council of the Society of Arts have decided to invite the opinion of the Jurors, the Commissioners for the Colonies and for Foreign Countries, and the principal Exhibitors at the International Exhibition, on the question of Awards of Merit in connection with International Exhibitions; and I am directed by the Council of the Society of Arts to transmit to you the accompanying Queries, with a request that you will favour them with your views on the subject, it being the intention of the Council to

embody the answers they may receive in a public Report:—

- 1.—Are you of opinion that Awards for Merit, by Medals or otherwise, in International Exhibitions, are desirable?
- 2.—State the reasons for your opinion.
- 3.—Ought Works of Fine Art and Designs to be excluded from the Awards?
- 4.—Can you suggest any better method than the appointment of Jurors for making the Awards?
- 5.—Can you suggest any improvement in the Constitution or proceedings of the Juries?
- 6.—Is any Appeal from the decision of Juries desirable?
- 7.—If you think Awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?
- 8.—Have you any further suggestions to offer on the subject?

It is particularly requested that any replies with which you may favour the Council may be sent not later than the 15th of September, and that they may be written on foolscap paper, on one side only, with an inch margin, and numbered corresponding to the number of the questions.

I am, Sir, your obedient servant.

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.—VISITS OF SCHOOLS.

The following is a continuation of the Schools reported to Her Majesty's Commissioners as having entered the Building, up to the 28th August, inclusive:—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Aug. 23	St. Ann's, Wandsworth	National	A Friend to the Charity...	60	60
" 25	Exeter-buildings ...	Ragged	Mrs. Macgarl	50	
" "	Westminster	Wesleyan Training	John Robinson Kay, Esq. ...	72	
" "	Chatham	Ragged	Subscription	50	
" "	Westminster	Wesleyan	J. Robinson Kay, Esq. ...	16	
" "	Aspley (Beds)	National	Mrs. Warr	51	239
" 26	Derby	National	H. M. Holmes, Esq. ...	300	
" "	Brentford	British	Baroness Rothschild ...	160	
" "	Westminster	Wesleyan Training ...	J. R. Kay, Esq. ...	32	
" "	Kildown, Kent ...	Christchurch	B. Hope, Esq. ...	11	
" "	Ashford	Welsh	Lord Dynevor	40	543
" 27	Highbury	Christchurch	Rev. — Macalpin ...	30	
" "	Farringdon-street ...	British	Committee	11	
" "	Pilton, Rutlandshire..	Parochial	Rev. J. B. Brown ...	22	
" "	Westminster	Wesleyan Training ...	J. R. Kay, Esq. ...	40	
" "	Saffron Walden ...	National	Subscription	50	235
" "	Lisson-st., Marylebone	Training Refuge ...	Committee	31	
" "	Stoke Newington ...	Lancasterian	Do.	38	
" "	St. George's-in-the- East	St. Stephen's Home... ..	Sisters of Mercy ...	13	
" 28	East Grinstead, Sussex	St. Margaret's	Sisters of Mercy ...	33	1,083
" "	Hampstead	West End... ..	W. Miles, Esq. ...	33	
" "	Hendon	National	A. H. Dendy, Esq. ...	69	
" "	Greenwich	Do.	Subscription	500	
" "	Old-street, St. Luke's.	St. Mark's... ..	Rev. — Lee	60	
" "	Westminster	Wesleyan Training ...	J. R. Kay, Esq. ...	22	
" "	Greenwich	Blue Coat	Subscription	34	
" "	Westminster	Wesleyan Training ...	J. R. Kay, Esq. ...	82	
" "	Rochester	British	Committee	22	
" "	Chichester	Choir	Rev. R. Sutton ...	34	
" "	Mile-end	Jews' Hospital ...	S. L. De Symons ...	85	
" "	Greenford	National	Committee	27	
" "	Great Marlow (Bucks)	Free	Subscription	37	
" "	Wimbledon	National	Mr. De Vas	11	
" "	Blackheath	Dartmoor-grove ...	Mr. Jas. Swift ...	34	

VISITS OF WORKMEN.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building up to August 28th inclusive :—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
Aug. 18	Clog and Patten Makers	Wapping	Subscription	50
" 20	Grocers' Assistants	Oxford-street	Messrs. Ellerby and Co. ...	20
" 23	Engineers	Greenwich	Messrs. Penn and Co. ...	1,600
" 25	Shipwrights	Poplar	{ Messrs. Westwood, Bailey, } and Co.	250
" "	Farm Labourers	Hatfield	Marquis of Salisbury ...	32
" "	Needlewomen	{ Manchester-sq. Needle- } women's Society ...	Miss Barlee	27
" "	Dragoons	Canterbury	The Officers	70
" "	Crew of the <i>Ellida</i>	Norway	Captain Dieson	56
" 27	Female Lunatics	Canterwell Asylum ...	Dr. Armstrong	26
" 28	Do.	Do.	Do.	28
" "	Sailmakers	Leadenhall-street ...	Messrs. Lee and Co. ...	26
" "	Lunatics	Biggleswade (Beds) ...	Messrs. Conquest	14
Total				2,199

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October.

PRODUCTS OF NATAL AT THE INTERNATIONAL EXHIBITION.

(Concluded from page 632).

The silk worm thrives in Natal. It is easily managed in the mild climate; and the over-abundant way in which the white mulberry establishes and multiplies itself, being in leaf for some nine months of the year, even so high as Maritzburg, ensures for it a never-failing supply of food. The production of silk in Natal is solely a question of labour and attendance. Hitherto there have been too many other doors ready open for the enterprise of white settlers for any one to have been induced to turn his attention to this particular branch of industry. Some samples are shown.

Of vegetable raw material, Cotton stands first; not on account of what has been done in Natal in furnishing this valuable staple, but on account of the interest that attends the question, at the present time mooted, of how far England's colonies may be made to minister to the voracious appetite of her cotton machinery. The cotton plant grows readily in Natal. During the last year nearly two thousand pounds weight of cotton wool, worth £43 sterling, was exported from the colony as the first-fruit of a series of small experiments. The six samples shown are specimens of this produce. The main difficulty for the present in the way of success seems to be the readiness with which white colonists find more productive application for their energies, and the unwillingness with which the Kafir enters upon any system of work that ties him to the performance of a certain task at a certain time. The Colonial Government is at the present time making an attempt to encourage the Kafirs to grow cotton. It would be premature to say much as yet upon the prospects of this experiment; but a sample, both grown and ginned by natives, is exhibited, as well as a specimen of the cotton in pod, and a sample of wool produced by a wild plant indigenous to the country, and known to the Kafirs under the name *monfanga*.

Flax has been grown in various localities, seemingly with success; but hitherto no experiment has ever been

made adequate to establishing the possibility of its remunerative cultivation. Here, again, the question appears to be very much more one of labour than of climate. A gentleman, who has had considerable experience in the growth of flax in Ireland, is at the present time investigating its various aspects and bearings. The Hemp grows wild and luxuriantly, as the sample, from the neighbourhood of Richmond, will show. It is generally found in the immediate neighbourhood of Kafir kraals, as if it had been primarily introduced by the Kafirs, after their discovery of the narcotic effects of its smoke. Specimens of fibres extracted from twenty-one different species of plants that grow readily in Natal are shown. The fibres employed by the Kafirs in the construction of their huts are all fragments of the inner bark of wild plants, torn from the stems as they are required.

An immense number of different kinds of Timber are furnished by the trees of Natal. Some of these have already established their characters in regard to usefulness, and are therefore deserving of respectful attention. The head-quarters of the timber trees, at present cut for constructive purposes, lie on the high grounds some thirty miles to the north of Maritzburg, about the sources of the Umvoti, Ungeni, and Umlazi rivers, and upon small tributaries that run into the higher parts of their channels, or into the Umkomanzi. The Kar Kloof, Umvoti, and Eland's river-bush, are all in this situation. The trees grow on the slopes of the hills, facing towards the moist south, and in the grooves of the natural water sheds, where water is always found. In the Kar Kloof, and on Eland's river powerful saw-mills, belonging to the Messrs. Shaw, and to Mr. Thew, are in full operation, driven by water-power. The timber cut at these mills is sent down to the markets of Maritzburg and Durban. The wide range of the coast bush furnishes yet other supplies.

The most abundant wood of the colony is that which is known under the name "yellow wood." This is the wood of a yew, the *Podocarpus elongatus*, which grows in the forests above Maritzburg. It is, however, far from being as durable as English yew. It has a compact look, and works well while still moist. But it is of short fibre and slight tenacity; and shrinks in seasoning, if it can ever be said to effect that process, more than any other of the useful woods. The yellow wood is, nevertheless, universally employed for building purposes, wherever there is protection from wet; and also in the construction of household furniture. When put to the latter use it has a better appearance than deal, which it somewhat resembles

in colour. Some specimens of it are even of ornamental vein, and worthy of varnish. If, however, it be varnished or painted before it is thoroughly dry, it decays very speedily. It is entirely unfitted for out-of-door work, and rots quickly when subject to exposure. The trees grow to a large size, and have a peculiar aspect, the tops being comparatively small, and the trunks bare for the greater part of their length. Logs are readily procured forty feet long and five feet in diameter. The price of the wood in the Maritzburg market is between eight and nine pounds for eight hundred superficial feet of plank scantling. There is a variety of the yellow wood known as the bastard yellow wood, which is the production of a yew, with smaller leaves, and with a stem commonly hoary with lichen, which is used for precisely the same purposes as the true yellow wood, and is considered by some authorities to be stronger when thoroughly seasoned. Sneezewood is the satinwood of Natal, so far as beauty of external aspect is concerned. It is the production of an upland tree of the horse-chestnut tribe—the *Pteroxylon utile*. The wood has received its name from the irritating character of its sawdust. It is a very hard ornamental wood, and contains a very large amount of resin. Its great value is its surprising durability when exposed to weather, and its immunity from the attacks of insects, properties conferred by its resinous principle. Instances are known in which posts of sneezewood have continued sound in the ground for sixty years. The fibre of the wood is long, tenacious, and straight. It is considerably stronger than yellow wood, and splits readily. The tree attains considerable size. The specimen exhibited is cut from a block sixteen feet long. The Stinkwood of the colony is the production of a species of laurel (*Oreodaphne bullata*), a tribe which also yields the greenheart of Demerara and the til of the Canaries, of which timbers the stinkwood may therefore be held to be the first cousin. The last-named wood has a more abominable odour than its Natal relative, when under the saw and plane. Stinkwood has a longer fibre and greater tenacity than sneezewood; but it is not so hard, and has much less durability in exposed situations. It breaks with a stringy fracture. It is, however, admirably adapted for the construction of furniture and for carving. When polished the wood is dark, and equal to the most ornamental specimens of walnut. The finest woods assume almost the beauty of tortoiseshell, and the markings are somewhat evanescent, as in other dark woods, unless protected from the influence of the air by varnish. Stinkwood is extensively employed in the manufacture of the rims of wheels. The tree also attains a large size. There is a specimen cut from a log between twelve and thirteen feet long. It is well fitted for veneers. Sneezewood and stinkwood are supplied in any quantity to the Maritzburg market at one shilling and ninepence the square foot of three inches thick. Under the present difficulties of land transport, the price of fine specimens in the English market would be from £25 to £30 the ton. There is a variety of stinkwood, known under the local name Candebo (vulgarly *cannibal*) stinkwood, of a darker colour, and more porous and woolly texture. It cuts with a surface resembling the nap of cloth. It is principally used for the formation of yokes for trek-oxen. The red speke wood, commonly known as the South African mahogany, is valuable for out-door work, and is durable in exposed situations. The assegai wood is the South African lancewood, and is the most esteemed for the construction of the spokes of wheels. The essen boom, South African ash, is a tree of the melecaceous tribe of plants, and is nearly allied to the neem-tree of India. Its wood makes most excellent furniture, and is largely employed in the fabrication of waggon chests. The black-iron wood is exceedingly dense, hard, and strong. It is most excellent for carvers' and turners' purposes. It is commonly used in the construction of the disselbooms and axles of waggons, and of cogged wheels. The unsimbiti is harder still, and is

durable in the highest degree; it too is used for waggon-axles. It is the wood out of which the Kaffirs make their beautiful walking-staffs. The untomboti wood is another very hard wood of this same valuable class, well adapted for turning. It has been employed for the construction of gunstocks. It is chiefly used for the axles of wheels, and is scraped by the Kaffirs to form a fragrant powder for dressing the hair. The red ivory, or red ebony wood, is a very beautiful production of the coast, exceedingly hard, and well suited for the turner. The wood of the wild lemon is chiefly used for the fabrication of the Dutchman's rude rein-shoe, for locking waggon-wheels. The white pear wood is employed in the felloes of wheels. The saffron wood is of very great toughness and strength, and is used for felloes, for tongues of waggons, and other waggon work. The knob thorn a (species of *xanthoxylon*), the rooi besje wood of the Dutch, the zuur besje, and the rooi els wood (red elder), are all beautiful and excellent for furniture. The specimens of the three latter are furnished by Dr. Hardiland, of the Hermannsburg Hanoverian Mission Station, who has used them largely in this way. The Rooi wood is used for spokes. The Camel thorn wood, only found in very high districts, is almost unequalled for density. It feels like a mass of metal in the hand. It makes very massive and beautiful furniture, resembling very old mahogany. The Umucodoti and the Umucose woods which are very little known, and hitherto not much employed, are both hard woods of great value; the latter being fragrant as well as hard. The wood known to the Dutch under the name of Smeece is also a valuable timber. The white iron wood is employed in waggon building, but soon decays. The under bush is used for spokes, but is not deserving of much confidence. The red and white milk woods of the coast are capable of being put to the same uses as stinkwood, and are occasionally employed in the construction of the axles or waggons. The rest of the woods exhibited in the Natal collection, are at present imperfectly known and little employed, although all identified by Kafir or local names.

Of barks there are several that are commercially useful, among which is a bark procured from the berea bush, and extensively used in tanning. The red mangrove bark from trees growing on the shore of the inner bay, and the mimosa bark, are also used for the same purpose.

The ground nut—a kind of underground bean—grows very luxuriantly in the lighter soils of the coast. This seed yields a fine oil for lighting purposes, but hitherto this has only been manufactured to a very limited extent. The specimen of the sesamum exhibited was grown by the Kafir Chief Siyengela. The castor oil plant is encountered almost everywhere growing wild, and in the most luxuriant state. Some nuts, known under the native name umbumba, are exhibited; they are full of an astringent principle, and have been successfully employed in tanning, dyeing, and manufacturing ink. The palm which yields both the vegetable ivory nut (*Phytolaphas*), and the leaf employed by the natives in basket-work, under the name "Ilala," grows abundantly on many parts of the coast. The arnotto dye is produced in the Botanic Gardens at Durban. The orchall (*Litmus Lichen*), occurs on trees at Durban. The madder root may be procured in unlimited quantity in the neighbourhood of Winberg, in the free states. The bamboo grows almost anywhere in the colony. Its canes are largely employed as whipstocks for waggon whips. The fruit of the *Adansonia Digitata* or baobab, renowned as one of the largest trees in the world, is remarkable for being filled with a powdery acidulous substance, whence it is commonly known as the cream of tartar fruit. The pulp of this fruit is mingled with water, and employed as a remedial drink in pestilential fevers and dysentery. The active principle appears to be not the tartaric, but malic acid. A species of *strychnos* grows wild everywhere upon the coast, under the name of the Kafir orange. The giant grass, known as tanbooti grass, which is principally used for thatching in Natal, and the smaller grass substi-

tuted for it when it is not to be obtained, are both shown. The hill sides and valleys of the uplands are entirely covered with a coarse herbage of this character, the tambooti growing principally on the better lands. It is through this herbage, when dried by the winter's sun, that the fires of the winter season sweep, the grass being ignited to clear the ground for a young verdure more serviceable to the cattle. Thatch forms by far the most comfortable roof for dwelling-houses, especially when it projects far enough to protect the walls from the direct rays of the sun. It is nevertheless rapidly giving way to tiles, and iron roofs, on account of the great risk there always is of the grass fires being swept upon houses by strong winds, to say nothing of the further danger from internal ignition. A roof at once fire-proof, cool, and economical, is a thing greatly to be desired in Natal. There is a substance called "Vegetable Wax" which is very curious; it is found adhering to the twigs of trees, as shown in one of the specimens, in the form of little grains. Each grain is the produce of an insect. It is a perfect wax, and is collected by the Kafirs for the formation of their head rings. The cactus, which supports the cochineal insect, grows freely in Natal.

The colonial manufactures, properly so called, are as yet necessarily of limited number. All young colonies look to the parent-state for their luxuries and articles of refinement, so long as they are engaged in the first toils of reclaiming the wilderness. That Natal is still doing this is sufficiently indicated by the fact that whilst its exports for the year 1861 were valued at £108,000, the declared value of its imports for the same period was £42,000. It, nevertheless, does many things for itself already, young as it is. Very creditable specimens of leather, made from buckskins, in Maritzburg, as well as soap, candles, and tallow, also prepared in the capital, are shown. Whipthongs, reims, which are at once halters and harness, and trektows, or ox-traces, made from the hides of oxen, buffaloes, and antelopes. Specimens of a very serviceable kind of travelling cap and bandoleer, manufactured in Maritzburg. Bundles of tobacco prepared on the coast and near the city, and Nonoti cigars. Illustrations of the book-binding of Maritzburg, and specimens of its printing are exhibited; the bricks of Maritzburg and its pavements and tiles. There are specimens of tanned leather, showing the way in which the buck skins, lion skins, and pig skins are prepared for the Natal market. The so-called camel leather is the tanned hide of the giraffe; it is principally employed to form the soles of the boer's shoes. The custom with the boer cobbler is to new upper-leather the soles, when his shoes have come to the point of needing repair, instead of re-sooling the upper leathers. Perhaps, however, upon the whole, the greatest triumph of South African ingenuity is the travelling waggon. This is made of the native woods, so adapted and put together that loads of three or four thousand pounds may be dragged over rocks, and through mire, up hill and down hill, by the powerful tug of 14 oxen, straining at the task by means of pronged yokes resting on the strong sinews of their necks. The yokes are attached to each ox by a pair of keys, and two of the leather reims passed beneath the throat and round the horns, and to the waggon pole, or disselboom, by the long trektow of wildebeest, or ox skin. The oxen are driven by the voice and by the lash of the long powerful whip, without any other appliance for guiding, and the waggon is left to its own strength and elasticity, and to luck. Now it rolls over boulders four times bigger than a man's head, jumping down with a jar that would dislocate any attachments but its own. Now it is dragged with reined and chained wheels down inclines that would be voted impracticable by extra African experience; and now it goes through rushing torrents, where the water is nearly up to the shoulders of the oxen, and where the unseen bottom of the channel is a series of jagged chasms, alternating with slippery slabs. From all which perils and obstacles it emerges and rolls on its way unscathed. It is at once

the house, the carriage, and the war-rampart of the Dutchmen of primeval colonial days, and the sole means whereby all inland traffic is carried on, and most trustworthy and admirable it proves itself in all its relations. A model of this ingenious machine is exhibited, reduced to a scale of one-third its usual dimensions, but with all its parts and appendages represented.

The ordinary riding whip of the Dutchman is a strip of sea-cow hide, fashioned by the knife into proper dimensions; but he occasionally amuses himself by making riding whips of a more ornamental, if less serviceable, kind of rhinoceros horn. He also fashions the same material into walking sticks, and occasionally attaches these sticks to handles carved from the bone of the giraffe. He also makes powder horns from the horns of oxen and antelopes, and pipes from horn and soapstone.

The most important object of Kafir manufacture is unquestionably the hut, which provides shelter from the heavy rains of the wet season and from the cold of night. A very fair idea of arrangement of a Kafir kraal, or series of huts, is given by a model, which was made expressly for the Exhibition, by the natives of the Indaleni Mission Station, situated on the Ilovu, twenty-four miles south of Maritzburg.

The mineral wealth of Natal does not rise beyond the scale of the respectable. Fortunately, the colony is a Canaan rather than an Ophir; a land of milk and honey—of beeves, wool, and sugar, rather than of silver and gold. Now and then, it is true, an over-sharp and shrewd colonist discovers a mine. Not even the diamond has escaped the sharp eye. Treasures of all descriptions have been supplied homœopathically for the Exhibition; but, by extreme good luck, in every case, the diamond has turned out to be quartz, the silver antimony, and the gold sulphur and copper. The basement of the land of the colony is one vast tumble of granite, and of trap, with patches of old sandstones and new shales notched in here and there, and with soils of varying fertility spread wherever water, and wind, and vegetable growth have been able to carry forward their appointed work of disintegration and transport. In brief, Natal is English Devonshire in an enlarged edition, upon a different hemisphere, and under a more sunny sky. Specimens of the building sandstones of Maritzburg and of a shale, almost universally adopted for foundations, are shown. There is plumbago in the neighbourhood of Richmond in great quantity, but, so far as has been examined, not of a very rich kind. There are seams of coals cropping out upon the sea at the mouth of the Umhlali, but this coal is of the lower carboniferous series, and little more than an intractable and obstinate anthracite, which takes a large amount of fuel to render it red-hot. The most useful coal of the colony is found in large masses in the Bickersberg, to the north of Klip River. This coal is serviceable to the smith under a sustained blast. There are rich ores of lead in the Transvaal States, near the Magaliesberg hills, which are worked by the Dutchmen, and furnish a large yield of metal. There is no absolute limestone in mass in the colony. Its formations are, upon the whole, older than the earliest calcareous beds. But there are concretionary deposits of a calcareous character here and there, which are seized upon for the extraction of lime. The soft silicate of magnesia, known as steatite, or soapstone, is found in various localities, and furnishes an admirable substitute for fire-bricks on account of its fire-resisting powers. The granites and the traps are in almost infinite variety, but so precisely like the granites and traps in England, in their essential qualities, that they are hardly worth exhibiting. There is a specimen of the sandstone found under the bluff sea-range at Durban, and employed in filling in the frames of the harbour works now in progress.

The western boundary of the colony is formed by the zig-zag line of the Drakensberg mountains, in reality a mighty step by which the descent is effected from the high plains of the interior of the continent into Natal. This mountain boundary is so much a step, that many of

the streams take their origin some distance to the westward of the actual ridge. The true boundary of the colony is fixed at the sources of these streams.

From the salient point of the Drakensberg, where the ledge projects furthest eastwards towards the sea, a lofty ridge shoots out, bending upwards through the Kar Kloof Hills to the neighbourhood of Greytown, and then curving eastwards along the channel of the Tugela to the sea. This is the great central back-bone of the colony. Where the high road from Durban to the Drakensberg crosses this ridge, it is more than five thousand feet above the sea. It is one remarkable peculiarity of this back-bone ridge, however, that it is not a simple spur; it is formed like a gigantic hand, and stretches its fingers as it runs from its focal origin, until the thumb forms the north bank of the Umkomanzi River, while the little finger constitutes the left bank of the Tugela. The tip of the great middle finger reaches to Durban, having passed not far south of Maritzberg. In the grooves lying between the five fingers are four rivers of secondary size, originating in the forks, and flowing out between the nail-tips to the sea. These are, counting from the north, the Umvoti, the Umgeni, the Umlazi, and the Ilovu. What may be termed the great central stretch of the colony is thus one divergent, four-grooved water-shed. The hill-ridges diverge from a common centre, and the rivers flow from the forks of the divergence. Within this region all the most important English settlements are contained; it comprises the settled counties of Maritzberg, the Umvoti, Durban, and Victoria.

North of the salient angle of the Drakensberg, its broken ledge forms a retiring angle, or bay, which sweeps backwards from the sea. From this bay, serrated spurs of hills advance converging upon the main channel of the Tugela, near to the meridian of Greytown. They do not, however, meet. Great gaps are left between the extremities of the ridges, through which the waters drain until they are collected in one stream. From the salient point of the Drakensberg, the derived ridges ray out, and the water, in obedience to the conformation, scatters to the sea-board. From the retiring bay of the Drakensberg, the derived ridges are gathered in, and the water, in obedience to the formation, gathers in too, bursting as separate rivers over the subsiding tips of the ridges, where these nearly meet, and then combining into one current, which becomes the royal river of the colony—the Tugela; although it is also but one-sided in its colonial relations, being a boundary river from the confluence of its upland tributaries. The great upland feeders of the Tugela are known as the Sunday River, Klip River, Central Tugela, Bushman's River, and Mooi River. These rivers drain the upland Dutch counties of Klip River and Weenen.

The main bulk of the colony of Natal is thus composed of an upland, convergent or gathering watershed, and of a lower divergent, or scattering watershed; a peculiarity which has been originally brought about by the character of the fissuring power which cracked the earth's shell when the Drakensberg step was reared. Where the fissure rayed seawards from a prominent angle of the zigzag, its subordinate offshoots were concentrated in the hollow of the bay. The most rugged parts of the colony lie along the central lines of these divergent and convergent systems. Towards the sea these central lines subside into low and softly-swelling hills. Even around Maritzberg the hill-tops are nearly all practicable to horsemen. The slopes are everywhere covered with green pasture and interspersed with tree-filled ravines. Four-fifths of the colony are comprised of the sinuous valleys that lie between these main ridges. In this particular the map is apt to convey a false impression of the character of the land. It looks to the eye as if the surface were everywhere rugged and broken. On the contrary, it is almost everywhere practicable and green. There are very few spots in it in which a bold horseman may not take his own line across country and arrive at his goal.

The great table mountains of Natal are nearly allied to their renowned prototype at the Cape. They are all

islands severed from the surrounding country by precipices altogether inaccessible, save by some chance gully or buttress that proves to be of less savage temper than its neighbours; but even itself requires the agility of the monkey to surmount its difficulties. These table mountains are flat topped, and present in their profiles zigzag walls of alternate green slope, and bare grey, vertical crag. They are invariably composed of silurian sandstone, overlying granite, which constitutes the mass of the lower buttresses, and which is encountered in huge boulders scattered all round the base. These isolated mountains are reared to a height of many hundred feet above the surrounding country.

The transverse back-bone ridge of the colony lies about eight miles from the sea, and there rises to an average elevation of a mile. The natural drainage of the secondary rivers, therefore, runs along a slope of about one in eighty, that is, of about an inch in six feet and a half. On this account the principal streams of the colony have a very likely movement, and the general drainage is excellent. The abundant moisture, and never-failing supply of water, is due to the fact that the prevalent wind is a vapour-charged sea-breeze, drawn in by the heating power of the sun's rays, in consequence of their absorption by the ground; and then driven along the upward slope, where, at every stage, less moisture can be sustained in the insensible state on account of the lowered temperature and expanded bulk.

The daily range of temperature is a comparatively narrow one during the summer season, and rises and falls abruptly from day to day; and a comparatively broad one during the winter, with far less marked risings and falls from day to day. During the summer months the mean temperature was mainly between 60° and 75°. It rose above 80° on forty-two days, and above 85° on nine days. The temperature fell below 60° on seventy nights, and below 50° on three nights. There were thirty-eight days on which the temperature did not rise to 70°. The lowest night-temperature of the season was 46°, and the highest day-temperature of the season was 89°.

The mean temperature of the winter months ranged chiefly between 55° and 70°; in the three mid-winter months between 50° and 60°. There were eighteen days on which the temperature rose above 80°; ninety-five days on which it rose above 70°; and only four days on which it did not rise to temperate 60°. There were twenty-six nights when the temperature fell below 40°, and only one night on which it fell below 35°. The coldest night-temperature of the season was 29°. The hottest day-temperature of the season was 95-6°. This occurred in September, during the prevalence of a hot wind. The greatest daily range occurs in winter time, and is between 30° and 35°. The mercurial column ranges higher in winter than in summer. It rose above twenty-eight inches twenty-four times during the summer season, and ninety-six times during the winter season. The wind invariably freshens at three in the afternoon. It was blowing from either east or south—that is, from sea to sea—at three in the afternoon, 172 times during the winter, and 153 times during the summer; that is, on 325 days out of the 365. The hot wind was blowing on seven days during the year; five times between July and September, twice during November and December.

Rain fell during the summer on ninety-two days: during the last nine days of the month of November, the heaviest fall, amounting in all to six inches and a-half, occurred. It fell on fourteen days during the winter season; not at all during the months of June, July, August, and September. The entire rain-fall for the year amounted to 26-35 inches. There were forty-nine thunder-storms during the summer months, and thirteen during the winter months; only two during the months of June, July, August, and September. It will be observed that the thunder-storms are nearly always coincident with the troughs of the waves of the atmosphere.

Four or five large atmospheric waves roll over the colony each month, and the thunder-storms occur when the depressions of the waves are present or at hand. During the summer months there were forty-five days of uninterrupted cloud, and eleven days of unbroken sunshine. During the winter months there were twelve days of unbroken cloud, and seventy-six days of unbroken sunshine.

The climate of Natal is, unquestionably, a very delightful one. Its great peculiarity is that its period of greatest heat is tempered by incessantly-recurring clouds, thunder-storms, and rain; while its period of greatest cold is as constantly cheered by recurring sunshine. The consequence of this is, that its summer is sprinkled throughout with fragments of winter-like freshness: and that its winter is almost melted away in sunshine. The day temperature in this approximately tropical region, where the sun becomes nearly vertical, during the six months of the last summer never once rose above 89 degrees; while there were only four days of the winter months on which it did not rise to 60 degrees, and one day towards the end of the winter on which it mounted above 95 degrees.

The city of Maritzburg stands two thousand feet above the sea, and fifty-four away from it. It experiences greater heat and greater cold than Durban, whose atmosphere is more like that of a steadily-warmed conservatory. On the whole, the mean temperature of Durban is, on this account, about five degrees higher than that of Maritzburg.

REPORT OF THE COMMISSIONERS OF PATENTS FOR THE YEAR 1861.

The Commissioners of Patents appointed under the Patent Law Amendment Act, 1852 (15 and 16 Vict., c. 83), in compliance with the terms of the third section of that Act, make the following report of their proceedings, under and in pursuance of the same, for the year 1861, in continuance of their report of proceedings for 1860.

The number of applications for provisional protection recorded in the year 1861 was 3,276; the number of patents passed thereon was 2,047; the number of specifications filed in pursuance thereof was 2,015; the number of applications lapsed or forfeited, the applicants having neglected to proceed for their patents within the six months of provisional protection, was 1,129.

The Act 16 Vict., c. 5, enacts that all letters patent for inventions to be granted under the provisions of the Patent Law Amendment Act, 1852, shall be made subject to the condition that the same shall be void at the expiration of three years and seven years respectively from the date thereof, unless there be paid, before the expiration of the said three years and seven years respectively, the stamp duties in the schedule thereunto annexed, viz., £50 at the expiration of the third year, and £100 at the expiration of the seventh year. The patent is granted for 14 years.

Four thousand patents bear date between the 1st Oct., 1852, and the 17th June, 1854 (being the first 4,000 passed under the provisions of the Patent Law Amendment Act, 1852). The additional progressive stamp duty of £50 was paid, at the end of the third year, on 1,186 of that number, and 2,814 became void. The additional progressive stamp duty of £100 was paid at the end of the seventh year on 690 of the 1,183 patents remaining in force at the end of the third year, and 796 became void. Consequently nearly 70 per cent. of the 4,000 patents became void at the end of the third year, and nearly 90 per cent. became void at the end of the seventh year. The number of patents sealed in 1854 was 1,876; the progressive duty of £50 due in 1858 was paid upon 558 of this number; and the progressive duty of £100 due in 1861 was paid upon 142 only; therefore the proportionate number of patents becoming void by reason of nonpayment is increasing.

All the provisional, complete, and final specifications,

filed in the office upon the patents granted under the Act since 1852, have been printed and published in continuation, with lithographic outline copies or the drawings accompanying the same, according to the provisions of the Act 16 and 17 Vict., c. 115.

The provisional specifications filed in the office and lapsed and forfeited have also been printed and published in continuation.

Printed certified copies of the specifications filed in the office, as also certified copies of patents, and of the Record Book of Assignments of Patents and Licences, with copies of such assignments and licenses, have been sent, in continuation, to the office of the Director of Chancery in Edinburgh, and the Enrolment Office of the Court of Chancery in Dublin, pursuant to the Act of 1852 and the Act of 16 and 17 Vict., c. 115.

The work of printing the specifications of patents under the old law, 13,561 in number, and dating from 1711 to 1852, was completed in 1858, and copies thereof are sold in the office at the cost of printing and paper.

Abstracts or abridgments of specifications, in classes and chronologically arranged, of all patents, from the earliest enrolled up to the present time, are in course of preparation and publication.

The Commissioners have thought it expedient to lay before Parliament, in the schedule to this report, an account of stamp duties in lieu of fees received under the provisions of the Act, with a balance sheet of their receipts and expenditure.

SCHEDULE.

AN ACCOUNT OF STAMP DUTIES received under the Act to substitute stamp duties for fees (16 Vic., c. 5,) for the year 1861.

	£.	s.	d.
3,276 petitions for grant of letters patent at £5 each	16,380	0	0
2,273 notices of intention to proceed with application, at £5 each	11,365	0	0
30 notices of objection to the grant of letters patent, at £2 each	60	0	0
2,049 warrants for patents, at £5 each	10,245	0	0
2,047 patents sealed, at £5 each	10,235	0	0
1,976 final specifications filed at £5 each	9,835	0	0
48 complete specifications filed at £5 each	240	0	0
577 entries of assignments of patents and licences, at 5s. each	144	5	0
755 searches and inspections, at 1s. each	37	15	0
11,040 folios of office copies of documents, at 2d. per folio	92	0	0
540 patents upon which the progressive stamp duty of £50 has been paid	27,000	0	0
142 patents upon which the progressive stamp duty of £100 has been paid	14,200	0	0
6 duplicate patents issued in lieu of original patents lost or destroyed, £5 each	30	0	0
14 petitions on application for disclaimers, at £5 each	70	0	0
10 caveats against disclaimers, at £2 each	20	0	0
5 new patents granted upon Her Majesty's Order in Council, under the 40th section of the Act (1852), being prolongations of patents granted previous to the Act, at £5 each	25	0	0
	£99,979	0	0

BALANCE SHEET OF INCOME AND EXPENDITURE FOR THE YEAR 1861.

RECEIPTS.

	£.	s.	d.
Stamp duties in lieu of fees	99,979	0	0
By sale of prints of Specifications, indexes, &c.	2,051	17	0
	£102,030	17	0

PAYMENTS.

	£	s.	d.
Fees to the law officers of England	8,965	19	0
Their clerks	814	5	0
Salaries of the officers and clerks in the Patent Office	6,573	0	0
Compensations	4,584	0	0
Current and incidental expenses in the Patent Office	4,153	18	1
Cost of stationery supplied by Her Majesty's Stationery Office, books for the free library, and binding, &c. ...	2,594	10	7
Rent of offices, rates and taxes	617	0	0
Messrs. Eyre and Spottiswoode for printing Specifications of Patents, indexes, &c., lithographers bills for drawings accompanying specifications	13,425	14	0
Cost of paper supplied to the printer and lithographer by Her Majesty's Stationery Office	2,786	13	2
Cost of coals and other fuel supplied to the Patent Office by Her Majesty's Office of Works, and furniture and repairs	131	19	10
Expenses incurred in respect of the Museum at South Kensington	1,190	13	7
Salaries of officers and clerks for ditto	730	0	0
* Revenue Stamp duty account as below	18,485	0	0
† Surplus Income for the year 1861	36,978	3	9
	£102,030	17	0

EXAMINATION PAPERS, 1862.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(Continued from page 634.)

FRENCH.

THREE HOURS ALLOWED.

PART I.

Candidates for a Third-class Certificate are to translate the following extract into English, and to answer the grammatical questions thereto annexed (in the order in which they are placed). This first part is all that will be required of them.

Je ne crois pas que le véritable amour de la liberté soit jamais né de la seule vue des biens matériels qu'elle procure; car cette vue vient souvent à s'obscurcir. Il est bien vrai qu'à la longue la liberté amène toujours à ceux qui savent la retenir, l'aisance, le bien-être, et souvent la richesse; mais il y a des temps où elle trouble momentanément l'usage de pareils biens; il y en a d'autres où le despotisme seul peut en donner la jouissance passagère. Les hommes qui ne prirent que ces biens-là en elle, ne l'ont jamais conservée long-temps.

Ce qui, dans tous les temps, lui a attaché si fortement le cœur de certains hommes, ce sont ses attraites mêmes,

* The Act of 1852 in lieu of the old duties upon patents imposed a revenue stamp duty of £5 upon the warrant of the law officer, £10 upon the certificate of payment of the progressive fee of £40 at the expiration of the third year, and £20 upon the certificate of payment of the fee of £80 at the expiration of the seventh year of the patent.

The Act of 1853 (16 Vict., c. 5) converted all the fees imposed by the Act of 1852 into stamp duties.

The Revenue Stamp duty account for the year 1861 is as follows:—

2,049 warrants of the law officers for patents at £5 each	10,245	0	0
540 patents on which the progressive duty of £50 has been paid at the end of the third year from their respective dates (£10 being Revenue Stamp duty and £40 fee stamp duty) 540 at £10 each	5,400	0	0
142 patents on which the progressive duty of £100 has been paid at the end of the seventh year from their respective dates (£20 being Revenue Stamp duty and £80 fee stamp duty), 142 at £20 each ... ;	2,840	0	0
	£18,485	0	0

† The aggregate surplus income, on balance of accounts from the 1st of October, 1852, to the end of the year 1861, and applicable to building purposes (vide Report to Treasury of 1858, p. 5), amounts the sum of 129,000.

son charme propre, indépendant de ses bienfaits; c'est le plaisir de pouvoir parler, agir, respirer sans contrainte, sous le seul gouvernement de Dieu et des lois. Qui cherche dans la liberté autre chose qu'elle-même est fait pour servir.—A. DE TOCQUEVILLE.

1. Parse the first and the last sentences in the above extract.

2. How do you explain the use of the *subjunctive* "soit né," in the first sentence?

3. The pronoun "qui," which begins the last sentence, is elliptical. State for what it stands.

4. The adverb *jamais* means sometimes *ever*, sometimes *never*, as exemplified in the extract. How is the difference of meaning conveyed in the sentence?

5. State the nature of the words *en* and *y*, which occur several times above, and say when *there* is to be translated by *y*, and when by *là*.

6. When are you to translate "it is" by "il est"?—when by "c'est," or again by "ce sont"?

7. Give the different meanings and constructions of the word *même*.

8. Add to each of the following nouns a suitable adjective which will show its gender:—*Exercice, zèle, rigueur, indice, opuscule, épiderme, quinine, soufre, tonnerre, solstice, tropiques, orage*.

9. Write in distinct lines, both the substantive and the adverb that correspond to each of the following adjectives:—*Beau, frais, sage, ferme, malin, curieux, faible, avare, jaloux, maigre, laid, rare*.

10. Show, with examples, where the French Syntax differs most from the English in the use of the *article*, both definite and indefinite.

11. Write the first person singular of the present conditional of the verbs *épeler, révéler, jeter, acheter*, and conjugate also the present indicative and the present subjunctive of the verb *déployer*.

12. Conjugate the verbs *s'abstenir* and *se convaincre*, giving the first person singular and plural of all the tenses, including the compound ones, with the English.

PART II.

Candidates for a Second-class Certificate are to answer the next four grammatical questions, and to translate the extracts and idiomatic expressions which follow:—

I. GRAMMAR.

1. Explain, with instances of different kinds, the principle of *euphony* as applied to the French Syntax.

2. Compare the English and French languages in reference to *inversion*, especially in poetry.

3. Give each verb in brackets in the following sentences its proper mood and tense:—

(a) Quand il [avoir] trente ans, il jugera mieux de ces choses-là.

(b) Si vous [savoir] combien il souffre, vous le plaindriez.

(c) Je ne [savoir] pas qu'il en soit ainsi.

(d) Je ne [savoir] pas qu'il en fût ainsi.

(e) Si je [savoir] qu'il en fût ainsi, j'aurais agi autrement.

(f) Je [vouloir bien] que vous fussiez ici.

4. Give each participle past its proper spelling in these sentences:—

(a) Avez-vous bien *préparé* toutes les règles que l'on vous avait *désigné*?

(b) Les explications que vous m'avez *entendu* donner l'autre jour ne vous ont-elles pas *suffi*?

(c) Ces constructions que j'ai *vu* commencer il y a trois mois sont déjà *achevées*.

(d) Les fatigues qu'elle a *eu* à endurer l'ont *rendu* malade.

(e) Le peu de bonté que vous leur avez *montré* les a complètement *découragés*.

(f) Le peu de bonté que vous leur avez *montré* leur a *rendu* l'espoir et la joie.

II. TRANSLATION.

Coal, salt, stones and earth are called minerals. Gold,

silver, iron, lead, copper, and tin are called metals. They are all very useful. We burn coal for fire in houses and in steam-engines, and for steam-boats and railways. We build houses and monuments with stone. Gold, silver, and copper are used to make money with. People who are rich often have a great many things in their houses made of gold and silver. Watches, rings, chains, pins, brooches, and buttons, are often made of gold. Silver is frequently used for spoons, forks, knives, plates, dishes, waiters, cups, tea-pots, coffee-pots, sugar-basins, milk-pots, and snuff-boxes. All our locks, bolts, bars, and a great many other things, which are very useful, are made of iron.—HUGHES.

Perseverance is a prime quality in every pursuit. Youth is, too, the time of life to acquire this inestimable habit. Men fail much oftener from want of perseverance than from want of talent and good disposition. As the race was not to the hare, but to the tortoise, so the meed of success in study is not to him who is in haste, but to him who proceeds with a steady and even step. It is not to a want of taste, or of desire, or of disposition to learn, that we have to ascribe the rareness of good scholars, so much as to a want of patient perseverance.—WILLIAM COBBETT.

III. IDIOMS.

1. Screw up your courage, and don't give it up.
2. Nothing venture, nothing have.
3. They can just make both ends meet.
4. Well, enough is as good as a feast.
5. Take my word for it, it will never answer
6. That is just like you.
7. I must go without, I cannot afford it.
8. That's right, cut your coat according to your cloth.
9. That is the right way to go to work.
10. Why, of course, it is.

11. Rira bien qui rira le dernier.
12. Je vous le donne en cent.
13. Ta, ta, ta, vous nous la donnez belle.
14. Ah ! c'est que lui, voyez-vous, il n'y va pas de main morte.
15. Il y paraît. Mais voyez donc comme il s'en donne.
16. A quoi bon se faire du mauvais sang ?
17. Au fait, il a raison de prendre la balle au bond.
18. Allons, au travail et qu'on se dépêche.
19. A bon chat bon rat.
20. J'y perds mon latin.

PART III.

Candidates aiming at a First-class Certificate are expected to translate the above list of idiomatic expressions and the short extract (on perseverance) that immediately precedes it, and also to answer, in *French*, any one question in each of the three following groups.

Weights and Measures.—1. When and by whom was the decimal system introduced, and what was its immediate object ?

2. Name the *units* of the decimal system, and show how each of them is connected with the *mètre*.

Literature.—1. Write a biographical sketch of either Malherbe, Descartes, or La Rochefoucauld.

2. State what you know of Port-Royal, its spirit and influence. Name some of its leading members.

History.—1. Explain the domestic policy of Richelieu, especially in reference to what was left of the old feudal spirit in the country.

2. Show the state of France at home and her position abroad at the death of Richelieu.

GERMAN.

THREE HOURS ALLOWED.

Each candidate is expected to translate one of the

following passages ; to answer some of the grammatical questions, and turn into German several of the sentences and pieces given for this purpose.

SECTION I.

1. Zwei Umstände begleiteten diesen Vorgang, welche die höchste Aufmerksamkeit der Protestanten erregen mussten, wenn auch das Interesse der Religion weniger wirksam bei ihnen gewesen wäre. Der Reichshofrath, ein willkürliches und durchaus katholisches Tribunal, dessen Gerichtsbarkeit ohnehin von ihnen so heftig bestritten wurde, hatte das Urtheil gefällt, und dem Herzoge von Bayern, dem Chef eines fremden Kreises, hatte man die Vollstreckung desselben übertragen. So constitutionswidrige Schritte kündigten ihnen von katholischer Seite gewalthätige Massregeln an, welche sich leicht auf geheime Verabredungen und einen gefährlichen Plan stützen, und mit der gänzlichen Unterdrückung, ihrer Religionsfreiheit endigen konnten.*

2. *Buttler* : Ein Jahr schon fehlt die Löhnung.

Wallenstein : Und sein Sold Muss dem Soldaten werden, darnach heisst er.

Questenberg : Das klingt ganz anders, als der Fürst von Friedland

Vor acht, neun Jahren sich vernehmen liess.

Wallenstein : Ja, meine Schuld ist es, weiss wohl, ich selbst

Hab' mir den Kaiser so verwöhnt. Da ! vor neun Jahren Bei'm Dänenkrieg, stell' ich eine Macht ihm auf Von vierzig tausend Köpfen, oder fünfzig, Die aus dem eignen Säckel keinen Deut Ihm kostete.—Durch Sachsens Kreise zog Die Kriegsfurie, bis an die Scheeren Des Belts den Schrecken seines Namens tragend. Da war noch eine Zeit ! Im ganzen Kaiserstaate Kein Nam' geehrt, gefeiert, wie der meine, Und Albrecht Wallenstein, so hiess Der dritte Edelstein in seiner Krone ! Doch auf dem regensburger Fürstentag Da brach es auf ! Da lag es kund und offen, Aus welchem Beutel ich gewirthschaft't hatte. Und was war nun mein Dank dafür, dass ich, Ein treuer Fürstenknecht, der Völker Fluch Auf mich gebürdet—diesen Krieg, der nur Ihn gross gemacht, die Fürsten zahlen lassen ? Was ? Aufgeopfert wurd' ich ihren Klagen,— Abgesetzt wurd' ich.

3. Und diese willkürlichen Veränderungen, diese unbeschränkten Eingriffe der höchsten Gewalt, sind sie nicht Vorboten, dass Einer thun will, was Tausende nicht thun sollen ? Er will sich allein frei machen, um jeden seiner Wünsche befriedigen, jeden seiner Gedanken ausführen zu können. Und wenn wir uns ihm, einem guten weisen Könige, ganz vertrauten, sagt er uns für seine Nachkommen gut, dass keiner ohne Rücksicht, ohne Schonung regieren werde ? Wer rettet uns alsdann von völliger Willkühr, wenn er uns seine Diener, seine Nächsten sendet, die ohne Kenntniss des Landes und seiner Bedürfnisse, nach Belieben schalten und walten, keinen Widerstand finden, und sich von jeder Verantwortung frei wissen.

4. Die Sachsen wendeten sich mit ihren Klagen nach Rom an Papst Gregor VII. Diesem Papste kamen sie sehr willkommen damit, denn er suchte eine Gelegenheit seine Macht den Kaiser fühlen zu lassen und dadurch zu beweisen, dass der päpstliche Stuhl höher sei, als alle Throne der Kaiser und Könige. Bis dahin war es umgekehrt gewesen, der Papst war in äussern Dingen abhängig von dem Kaiser. Denn weil die deutschen Kaiser als die Nachfolger der alten römischen Kaiser angesehen wurden, so war die Stadt Rom und auch ihr Bischof, obwohl er in geistlicher Hinsicht als der erste Bischof in der Christenheit galt, ihnen im Weltlichen untergeben, und es war deshalb, wie wir wissen, zwischen mehreren Kaisern und den Römern ausdrücklich ausgemacht worden, dass

kein Papst ohne kaiserliche Bestätigung gewählt werden dürfe. Das wollte nun Gregor gänzlich ändern; der Papst sollte einzig und allein von den Cardinälen, nämlich den Hauptgeistlichen in Rom, gewählt werden und völlig unabhängig vom Kaiser sein; ja dieser sollte im Gegentheil nun vom Papste eingesetzt werden, ohne dessen Bestätigung nichts gelten, und auch von ihm wieder abgesetzt werden können, wenn er sich seines Amtes unwürdig machte. "Alle weltliche Macht," sagte Gregor, "muss der geistlichen unterworfen sein. Die Welt wird durch zwei Lichter regiert, die Sonne, das grössere, und der Mond, das kleinere. So ist nun die päpstliche Gewalt wie die Sonne, die königliche Macht wie der Mond; denn wie dieser sein Licht von jener hat, so sind Kaiser und Könige und Fürsten nur durch den Papst, weil dieser durch Gott ist; sie sind ihm unterthan, und ihm gehorsam schuldig."

SECTION II.

GRAMMAR AND MEANING OF WORDS.

- (a.) When are adjectives declined?
- (b.) State the differences in the declension of adjectives, and by what circumstances these differences are caused.
- (c.) State in what points the arrangement of words in German sentences and periods principally differs from that pursued in English.
- (d.) Give ten verbs which form their perfects and pluperfects with the auxiliary *sein*, while in English they form it with *haben*. Give also the past participles, the first person of the imperfect (indicative and subjunctive), the second and third person singular of the present indicative, and the second of the imperative, if they should be irregular.
- (e.) Name the different cases and prepositions required by the following verbs, and state the meanings they have with each; illustrate them by examples.
Denken; warten; sagen; sprechen; bestehen; lachen; spotten.
- (f.) What is the meaning of the verbs in the following phrases:—
Ich warte ihm auf; ich warte auf ihn.
Ich durchlief das Buch; der Hund lief mir durch.
Er umging den Hauptpunkt; er geht mit einem schlechten Menschen um.
Es fehlt mir Geld; es fehlt mir an Geld?
- (g.) What is the difference between fragen and fordern; rauben und berauben; aber and sondern (but); wie and als (as); wann and als (when); auf dem Lande and in dem Lande; der See and die See; der Thor and das Thor; essen and fressen; trinken and saufen; sinken and senken; springen and sprengen?
- (h.) Correct the following sentences:—
Dies geschahete der zwölfter Januars in das voriges Jahr.
Ich stellte mich an einem Fenster, dass auf dem Felde ging.
Ehe Sie in Stadt kommen, Sie müssen steigen ein Berg.
Habend seit lang nicht gehört von meinen Bruder, ich fürchte mich, er ist krank.
Ich war jede Woche von ihm gehört haben; aber es haben drei Poste gekommen herein, und ich habe kein Brief bekommen.
Wenn Sie hatten geblieben langer bei uns, Sie hatten gekonnt mein Bruder sehen.
- (i.) What cases are governed by the following verbs and prepositions:—
Nachahmen, unterwerfen, sich erbarmen, gedenken, glauben, begegnen; mit, über, an, nach, um, an, trotz, wegen.

SECTION III.

Translate into German ten of the following passages, either in English or German characters, but very legibly:

1. He dined with me at my hotel.
2. He has never dined with us (viz. at our house).

3. She trembled with cold.
4. With such a noise, I cannot hear.
5. Will you take this letter with you for me?
6. Sit down and play for me.
7. I never play at cards for money.
8. What do you use this machine for?
9. I do not know what it is used for.
10. Why did you allow this trifling dispute to come to a law-suit?
11. I did not let it come to it. It was brought to it by my attorney.
12. Not having any interest in it myself, I left it entirely to him, relying on his good sense, knowledge of the law, and integrity.
13. I am just having a book printed which I wrote last year, while I was travelling on the Continent.
14. I remember, you were engaged upon it, when I met you at Milan, on my way to the East.
15. When it is finished, I shall have much pleasure in sending you a copy of it.
16. Why do you copy this?
17. It is so indistinctly written, that I am afraid that I shall have to copy nearly the whole work, before I send it to the printer.
18. Can your uncle send off this letter this evening?
19. I don't think he can.
20. If he could, he would render me a great service, and I should be grateful to him all my life.
21. He will, I am sure, do his utmost to oblige a friend like you.
22. Tell me in what way I can serve you?
23. I could not have sent your letter, if I had wished it ever so much.
24. Often the more one wishes to oblige a friend, the less one has it in one's power to do it.
25. Have you seen the papers?—Yes, I have.
26. Have you read the great news from America?—No, I have not.
27. Must he be at home before dark?—Yes, he must.
28. Did you receive any letters with the last Indian mail?—Yes, I did.
29. The money he lent you was not his.
30. It belonged to a sister of his, who had entrusted it to him.
31. I never asked him whose money it was, whether his or any one else's.
32. I merely asked him whether he would do me the favour to lend me such a sum as I then needed.
33. The fact is, I wanted the money to help a most worthy man out of a great difficulty, into which he had got without any fault of his.
34. What is to be done?
35. Where am I to go to?
36. I was to have gone to College; but having no inclination to study, and fearing that, if I did not work there, I should only get into scrapes, I would not do it, and preferred entering the army.
37. If you were to stay here a few months longer, you might see the Great Exhibition.
38. Where did you have your last work printed?
39. It is a very well printed work.
40. It has been printed by a young man whom my late father had educated in France and Germany.
41. You had better put up with the loss which your credulity brought you.
42. The more you now complain of your misfortune, the more people will laugh at you.
43. Man seems to have by nature an inclination for war as certain animals for prey. In order not to sink into the brute, man must form and ennoble every animal impulse; consequently also this. Then will the inclination for war, which rude and shapeless is a disgrace to humanity, become a source of new virtues of magnanimity, bravery, and every manly greatness. Therefore every effort of improving the art of war is not the sad employment of the invention of new methods of skilfully murdering, but

a service to humanity. The more perfect the art of war is, the more dangerous it is to begin wars, the more rarely they will be carried on, the more the mode of conducting them is removed from savage slaughtering.

SUBJECT FOR A SHORT AND CONCISE ESSAY, FOR A FIRST-CLASS CERTIFICATE.

Wenn, und durch wen wurde das deutsche Reich aufgelöst? Wer war zur Zeit deutscher Kaiser, und welchen Titel nahm derselbe nach Niederlegung der deutschen Krone an? Und welche Einrichtung trat an die Stelle der alten Reichsverfassung?

(To be continue.)

Home Correspondence.

STRUCTURE OF COPPER.

SIR,—In my letters published in the *Journals* of the 18th October and the 1st November last, I explained that all manufactured copper showed a porous or cellular structure; and I have now to state that native copper generally shows a crystalline structure; indeed, like all copper the produce of cementation, our native coppers are an aggregation of crystals. The structure of the native copper of the Lake Superior district of North America is, however, very different from other native or manufactured copper; it is neither cellular nor crystalline, but dense, ductile, and wavy in structure, giving the idea of its having been moulded and forced into its present shape while in a cold state; and in this respect it perfectly resembles native gold and silver; and it is remarkable that the same copper when once melted assumes the cellular structure of all other manufactured copper.

Now it seems to me that the proper inference to be drawn from the above peculiarity in structure is, that this native copper is not deposited from a solution like our native copper, neither was it deposited under the agency of fire, else it would have been either crystalline or cellular in structure, unless it has undergone some other very material change.

Having stated the above facts I have no wish to speculate upon the cause of this peculiarity.

I am, &c.,

W. VIVIAN.

Parys Mines, near Bangor, N. Wales, Aug. 27, 1862.

Proceedings of Institutions.

BIRMINGHAM AND MIDLAND INSTITUTE.—The report of the Council for last year says that although no event of special importance has occurred during the year, the growing usefulness of the classes, and their appreciation by the public, the greatly increased attendance at the lectures, and a more healthy financial position than has hitherto been attained, afford matter for congratulation. The entries of pupils have increased, and their progress, as evidenced by the results of the examinations of the Government Science and Art Department, and the Society of Arts, has been equally satisfactory. The financial accounts show that the debt has been nearly discharged, while the income from the general and industrial departments—in both of which there is still great room for increase—has yielded a fair working revenue. The Council, bearing in mind the desirability of making the Institute the centre of the literary and scientific life of the town, have, during the year afforded accommodation to several societies of that character; and from the desire to make the building generally useful, they have provided the members of the New Exchange with rooms for their daily

meetings free of charge. During the year the donations have been numerous and valuable. Four pictures, bequeathed by the late Mrs. Barber, have been received, and in these the Institute possesses some of the finest specimens of landscape painting. The pecuniary value of the four pictures is great, but their artistic worth, as illustrating an important period in the history of English landscape painting, is even more considerable. These pictures, and the two admirable portraits by Sir John Watson Gordon, form the commencement of a gallery of art, to which the Council invite contributions. The bequest by Mrs. Barber was accompanied by a legacy of £50. During the year thirty lectures have been delivered, the programme embracing subjects of a literary, scientific, and social character. The attendance at these lectures has been greater than in any former year; and by sparing no pains to secure the services of gentlemen of the greatest attainments, the council hope to maintain the high character and varied interest which have made the lectures generally acceptable to the members. The Council have had under their consideration the desirability of having a series of lectures illustrative of the manufacturing processes of Birmingham and the district. Hitherto considerable difficulty has been experienced in obtaining the services of competent lecturers, and the Council invite the co-operation of the members in effecting this desirable object. The museum continues to be used by a constantly increasing number of visitors. The return shows that the visitors exceeded those in 1860 by 773. As the excellent collection of geographical and other specimens is open free to the public, the Council again direct the attention of teachers of schools to its educational usefulness. Under the care of Mr. Woodward, the curator of the Museum, the final arrangement of the specimens is being proceeded with. A series of characteristic fossils has been arranged in proper geological order, which, when labelled, will make the collection an epitome of the science of palæontology. The series of shells has been named generically, and a catalogue of the British marine shells has been made out. A collection of coins has been commenced, and already some interesting specimens have been kindly presented. Much interest is taken by many of the visitors to the museum in the progress of the arrangements, and they look forward to the completion of the work with pleasure. The anemometer, for which the Institute is indebted to Mr. F. Osler, is now complete, and a record is made of the velocity, direction, and pressure of the wind, and of the amount of rain-fall. A register of barometrical and thermometrical observations will shortly be commenced. Numerous additions have been made to the Patent Specification publications during the year, and the attendance has slightly increased, viz., from 456 in 1860 to 506 last year. At the date of the last report negotiations were commenced with the town council for the transfer to them of the unoccupied land belonging to the Institute, as a site for the central free library. This transfer has now been made. The thanks of the members are again due to several gentlemen for their gratuitous lectures, and to the donors of many acceptable gifts. The most notable event in the industrial department is the first examination of the students by the Science and Art Department of the Committee of Council on Education. As the members are aware, the Institute has been for some years associated with the Society of Arts, in whose examinations the students have honourably distinguished themselves. Last year, for the first time, the Government Department of Science and Art resolved to test the efficiency of the instruction given in science schools conducted by certificated teachers. Nineteen students connected with the classes in the Institute presented themselves for examination, and every one of these students passed, ten of them taking honours, and two of these—Mr. James Russell and M. Charles Preston—carrying off medals. The examination of the Society of Arts also resulted very favourably. The result of the Institute examinations shows a higher standard of proficiency than has heretofore

been attained. Last year the number of teachers and Council certificates was greatly in excess of 1859. The following return shows a still larger increase in 1861:—

	1860.	1861.	Increase.
Teachers' Certificates	62	66	4
Council	16	23	7
Prizes	6	7	1

While these multiplied tests of the character of the instruction are thus satisfactory, the attendance is not less a matter for congratulation. The income of the general department for the past year has not only been sufficient to cover its expenditure, but to discharge the excess of expenditure of the industrial department. The Council have received from the corporation the amount expended by the Institute in the purchase of the leasehold property transferred to the corporation for the purpose of the free library; and the amount received for interest, &c., thereon has favourably affected the income of the year, and nearly extinguished the debt of the Institute. Leaving out, however, this exceptional item, the income amounts to £723 16s. 10d., and the expenditure, including balance of school account, to £667 7s. 2d. In the industrial department the expenditure has exceeded the income by the sum of £141 6s. 4d. This outlay, however, is accompanied by the gratifying fact that there has been received for class fees the sum of £21 9s. 10d. in excess of the previous year, indicating an increased development of the educational branch of the Institute. The Council have to congratulate the members on the fact that the balance sheet is now in so satisfactory a condition; the total liabilities against the Institute on the 30th of November last amounted only to the sum of £181 3s. 2d., while the assets amounted to £109 1s. 11d.; so that the comparatively small sum of £73 would entirely free the Institute from debt. The following lectures have been delivered* :—“The Music of Mendelssohn, with Illustrations,” Mr. Thomas Anderton; “Pre-Historic Britain; its Arts and Architecture,” Mr. Sebastian Evans, M.A.; “Failures and Successions in Life,” Rev. H. W. Holland; “*Adulteration of Food and Drugs,” Dr. Alfred Hill; “*Art of the Novelist—Character Painting,” Mr. W. Kendrick; “Induced Electricity,” Dr. Henry M. Noad, F.R.S.; “*Dante and his Times,” Rev. Dr. Badham; “The Physiology of Digestion,” “The Physiology of Circulation,” “The Physiology of Respiration,” “The Physiology of the Nervous System,” Dr. Edwin Lankester, F.R.S.; “The American Revolution of 1861; its Consequences to Liberty, Civilization and Commerce; to the People of the Free Labour, Cotton, and Border Slave States, Great Britain, and British America,” Mr. P. H. Andre; “*Sir Philip Sidney,” Rev. E. H. Gifford, M.A.; “The Music of Beethoven, with Illustrations,” Mr. Thomas Anderton; “The Life and Works of Thomas Hood,” Mr. George Dawson, M.A.; “*The American War and its Causes,” Mr. E. F. Flower; “Early Christian Art,” “Byzantine Art,” “Early Mediæval Art,” Dr. Kinkel; “The Gorilla—Compared and Contrasted with Man,” Mr. B. Waterhouse Hawkins, F.L.S., F.G.S.; “Ill-used Men,” Mr. George Dawson, M.A.; “Glass Painting,” Mr. Sebastian Evans, M.A.; “*Pascal and Montaigne,” Rev. Dr. Badham. With regard to the classes the teachers' reports show that in chemical or experimental physics, the average attendance has been about 16. The subjects treated in the winter and spring terms were electricity and magnetism, with which the two years' course was concluded. In the autumn term a new course was commenced with pneumatics and acoustics. In elementary chemistry, the average attendance has been about 35. The attention and progress of the pupils are very satisfactory. In analytical chemistry, the average attendance has been five. The students are proceeding steadily and satisfactorily with their work. The chemical society, formed of the present and past members of the above classes, and conducted entirely by themselves, is still going on prosperously.

* The Lectures marked with an asterisk were delivered free of charge.

They are forming a library of scientific works, which, though small, is of great service to the members, who made very good use of it. Various papers were read during the year by members of this society. At the penny lectures, the average attendance has been—winter term, 117; spring term, 69; autumn term, 160. The increase of attendance during the last term is mainly due to the subject, the “Outlines of Chemistry,” which is the most popular. These outline courses are arranged to serve as introductions to the courses in the class, the penny lecture course terminating just before the new course in the class commences. In the arithmetical and mathematical classes, the attendance has been good, and the students have manifested in their work an earnestness which is particularly gratifying. In the English history and literature class, it has been found necessary, on account of the difficulties of treating both subjects, and in order to meet the wishes of the students, to subordinate the history to the literature. Both subjects have, however, received attention in the study of Shakespeare's historical plays, which have been carefully read, with historical and literary illustrations. King John, Richard the Second, Richard the Third, Henry the Fifth, and Henry the Eighth have been explained; and as the programme of the Society of Arts included Hamlet, that play also has been the subject of minute and careful study. The class numbered only seventeen members during the winter term, and sixteen during the spring term, but the numbers rose to twenty-six during the autumn term, with an average attendance of fourteen. In the French class, the average attendance has been 150. The attention has been incessant, and the progress considerable. In connection with the French class, a “Société de Conversation et de Littérature Françaises” has been formed. In the English grammar and composition class, the number of names on the register for the autumn term is twenty-seven, which is an increase upon the attendance of the two previous terms. The progress of the students has been satisfactory.—The class for botany has, on the whole, made satisfactory progress during the year, except in the number of members, which has not been large.—The writing class, although only recently established, seems in a flourishing condition. The number of students has risen from 26 last winter term, to above 40 in the autumn term; their attendance is good, averaging about two-thirds of the entire number.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, August 29th, 1862.]

- Dated 17th April, 1862.*
1132. S. Rideal, Manchester, and R. Shepherd, Great Grimsby, Lincolnshire—Imp. in railway break apparatus.
- Dated 15th July, 1862.*
2029. A. Couvreur, 42, Bridge-street, Blackfriars—An improved centrifugal apparatus for breaking stones.
2031. A. Couvreur, 42, Bridge-street, Blackfriars—An improved centrifugal apparatus for casting stones and other materials, and in forming embankments and other structures.
- Dated 21st July, 1862.*
2069. W. Green, 2, St. Paul's-buildings, Little Carter-lane—An improved method of cutting sheet and plate glass to any given design, giving the finished form the brightest polish possible. (A com.)
- Dated 24th July, 1862.*
2109. M. Henry, 84, Fleet-street—Imp. in apparatus for retarding and stopping carriages, especially applicable to railway carriages, and in disconnecting apparatus for carriages. (A com.)
- Dated 2nd August, 1862.*
2191. E. B. Wilson, Parliament-street, Westminster, and M. Picard, Lyons, France—Imp. in the manufacture of iron and steel.
- Dated 5th August, 1862.*
2200. M. J. Roberts, Pendarren-house, near Crickhowell—Imp. in means or apparatus for spinning and preparing wool and fibrous substances.
2209. M. A. F. Mennons, 22, Rue du Mont Thabor, Paris—An improved self-inking hand stamp. (A com.)
2213. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in blast furnaces. (A com.)

2217. B. Coombe, 30, Mark-lane, London—Imp. in apparatus or machinery for cleaning and decortiating wheat and other grain.

Dated 8th August, 1862.

2219. E. Hall, Butts-green, Luddenden Foot, near Halifax—Imp. in means or apparatus for preparing foreign grain for grinding.

2221. F. M. Jennings, Cork—A composition for coating ships' bottoms to prevent fouling.

2223. N. J. Amies, Manchester—Certain imp. in the manufacture of bearings, "journals," and "steeps," employed in machinery, and for carriage and other axles.

2227. J. Tatham, Rochdale—Imp. in machinery or apparatus for preparing, spinning, and weaving cotton and other fibrous materials, parts of which imp. are also applicable to other mechanism, in which an uniform or variable rotatory motion is required.

Dated 9th August, 1862.

2228. J. Macintosh, North Bank, Regent's-park—Imp. in obtaining and applying motive power.

2229. R. Fowler, Glasgow—An improved manufacture of woven, plated, knitted and other fabrics.

2231. Sir J. S. Lillie, K.C.B., 105, Pall Mall—Imp. in carriage ways and footways.

2233. A. J. Moreau and A. E. Ragon, Bernard-street, Russell square—Imp. in the mode of and apparatus for treating bituminous and carbonaceous substances for the purpose of obtaining the various products, volatile, liquid and solid, which they contain, and also in the treatment and application of such products.

2235. T. De la Rue, 84, Westbourne-terrace—Imp. in the manufacture of pigments and writing inks.

Dated 11th August, 1862.

2237. H. B. Barlow, Manchester—Imp. in machines for weaving, warping, sizing, and dressing. (A com.)

2239. W. E. Newton, 66, Chancery-lane—Imp. in machinery for compressing powder for cartridges. (A com.)

2241. T. Holdsworth and J. Crossley, Halifax—Imp. in means, machinery, or apparatus for warping, scouring, sizing, stretching, measuring, cooling, drying, and beaming yarns for weaving.

2243. N. J. Amies, Manchester—Imp. in the manufacture of bearings or steps employed in machinery and railway and other carriages, and in a composition to be applied thereto.

2245. M. H. Champion, 15, Passage des Petites Ecuries, Paris—Self-closing buttons, fastening without thread or needles.

2247. J. Combe and J. H. Smalpage, Leeds—Imp. in the action and arrangement of machines for winding cops, and in apparatus for holding and receiving such cops when used for warps or sewing thread or other purposes.

2249. A. J. Martin, High-street, Bow, J. Goss, Prospect-house, Bow-road, and J. Bush, Bow-common, Bromley—Imp. in apparatus for distillation.

Dated 12th August, 1862.

2251. W. Macnab, Greenock—Imp. in steam boilers and in apparatus for feeding the same, and for effecting circulation therein.

2253. J. Dickson, 66, Tollington-road, Holloway—Imp. in treating zinc ores and solutions of zinc to obtain zinc therefrom.

2255. L. Serbat, 4, South-street, Finsbury—Certain imp. in lubricating machinery.

2256. C. A. Wheeler, Swindon, Wilts.—Imp. in machinery for perforating paper.

2257. A. Delrue, Dunkirk, France—Imp. in compositions for preventing and removing incrustation in boilers.

2259. J. Langran, Kimbolton, Huntingdonshire—Imp. in apparatus for driving agricultural machinery.

2261. A. B. Childs, 481, Oxford-street—Imp. in machinery for cutting veneers. (A com.)

2263. G. Sanders, Nelson place, Old Kent-road—Imp. in domestic fire-escapes.

Dated 13th August, 1862.

2265. J. Dickson, 66, Tollington-road, Holloway—Imp. in the manufacture of chlorine for commercial purposes.

2267. J. Cooper, Town Mall, Kent—Imp. in valves and buckets for pumps, and in valves or cocks for other uses.

2268. J. Smith, Regent-street, Mile End-road, and J. S. Rayment, Rayment-road, Grove-road, Mile End—Imp. in apparatus for generating steam, and for regulating its flow, part of which improvements are applicable also to other purposes.

2271. W. L. Boyle, Eastbourne-terrace—Imp. in the construction of chairs and foot stools for the use of dentists, and in chairs, couches, and beds for invalids.

2273. H. Twelvrees, Bromley—Imp. in rat and mice traps.

2275. L. D. Verstraet and E. M. Olivier, 29, Boulevard Saint Martin, Paris—A new process of manufacturing carbonate of soda by the application of sulphuret of sodium, and in apparatus for the same.

2277. W. Schnell, 63, Charlotte-street, Fitzroy-square—Imp. in extracting the sulphur and sulphurous acid from the oxy-sulphuret of calcium, which is contained in the residues or waste material obtained in the manufacture of soda. (A com.)

Dated 14th August, 1862.

2279. E. J. Dagnall, Point Pleasant, Wandsworth, Surrey—An improved tray or receptacle adapted for wash-hand stands for holding tooth brushes, tooth powder, and nail-brushes.

2281. J. Irvine, Pat-shill, and J. W. Hand, Beckbury, Shropshire—A new or improved rifle-rest.

2283. G. Welch, Birmingham—Imp. in inkstands, metallic pens, and penholders, and other instruments and appliances used in writing and marking.

2285. W. Beatson, Rotherham, Yorkshire—Imp. in the manufacture of stoves.

2287. D. P. Marques, Barcelona, Spain—Imp. in apparatus for cleaning the bottoms of ships and vessels. (A com.)

2289. J. Petrie, jun., Rochdale—Imp. in machinery or apparatus for blowing and exhausting air.

2291. J. Hopwood, Ashton-under-Lyne—Imp. in machinery or apparatus used for collecting fibrous material and dirt from the carriage boards and roller beams of mules and other similar machines used in spinning.

2292. J. Hearn, Hatford, Berkshire—Imp. in apparatus or appliances for raising sick or bedridden persons in their beds, and for raising their bed-clothes.

2293. W. Souter, Birmingham—Certain apparatus for raising and planishing metals.

2295. J. S. Blockey, Hyde-park, Leeds—Imp. in the manufacture of colouring matters.

2297. C. E. Spagnoletti, Paddington—Imp. in apparatus for signalling trains on railways.

Dated 15th August, 1862.

2301. T. Carvin, Landport, Hants—Imp. in screw propellers.

2303. J. Newman, Birmingham—Imp. in machinery for the manufacture of metallic tubes.

2305. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in electro-magnetic time-keepers. (A com.)

Dated 16th August, 1862.

2307. H. Garside, Coupland-street, Manchester—Imp. in machinery or apparatus for marking, etching, or engraving on cylindrical and other surfaces.

2309. T. Knowles and W. Robinson, Manchester—Imp. in racks for window blinds.

Dated 18th August, 1862.

2313. F. Barnett, 230, Oxford-street, London—An improved lamp or lantern for street lighting and other purposes.

2315. J. T. Oakley, Grange-road, Bermondsey—Imp. in heating stoves employed for drying and other purposes.

2319. H. Melton, Regent-street—Imp. in the manufacture of hats and caps.

Dated 19th August, 1862.

3321. V. F. Cleuet, Paris, Rue d'Allemagne, No. 182—An improved self acting apparatus for supplying boilers with water, applicable also to the raising and to the measuring of liquids.

2323. S. Boucher, Warchin, near Tournai, Belgium—Imp. in flax spinning, which improvements are also applicable to spinning of tow and hemp.

2325. T. H. Falkiner, Dublin—Imp. in the permanent way of railways.

PATENTS SEALED.

[From Gazette, August 22nd, 1862.]

29th August.

557. M. Dodds.	614. R. Wright.
556. S. Hague.	625. J. Platt and W. Richardson.
562. A. E. Ragon.	645. W. S. Nosworthy.
563. A. Potts.	647. J. B. G. M. F. Piret.
564. P. Robertson.	664. A. R. Le Mire de Normandy.
566. J. G. Jennings.	673. P. Gondolo.
568. L. Martin.	691. M. Henry.
570. J. W. Davis and F. Davis.	765. R. Wilson.
576. J. Schofield.	766. S. Moore.
578. T. Tillam.	886. J. Clinton.
579. A. Bedborough.	1017. W. E. Newton.
582. W. Conisbee.	1107. W. E. Newton.
588. P. Schafer and F. Schafer.	1247. J. W. Caley & F. G. Caley.
591. A. J. Sedley.	1379. J. Fowler and J. King.
592. G. H. Cottam and H. R. Cottam.	1395. J. Oxley.
594. G. F. Guy.	1402. J. F. Milward.
597. J. Somervell and R. M. Somervell.	1491. N. Thompson.
600. T. Boslock.	1604. H. Saunders & J. H. Miles.
	1879. J. H. Johnson.
	1896. C. Beslay.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, September 2nd, 1862.]

26th August.

1959. J. Whitworth.	2064. A. V. Newton.
1960. T. Meriton.	2109. W. E. Newton.
1995. T. Aveling.	<i>29th August.</i>
2001. W. Brown, jun., and S. Bathgate.	1983. S. Middleton.
<i>28th August.</i>	<i>30th August.</i>
1975. J. Field.	1993. J. A. Simpson.
	2021. B. Lauth.
	2098. A. Applegath.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, September 2nd, 1862.]

25th August.

2002. W. De la Rue.	<i>28th August.</i>
	1964. P. E. Charton.
<i>26th August.</i>	<i>30th August.</i>
1941. W. Johnson.	1969. J. Hope and T. Hope.
	1995. G. Clark and J. Clark.
	2021. G. Lowry.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 12, 1862.

INTERNATIONAL EXHIBITION OF 1862.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s. ; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

It was the intention of the Council to issue the volume complete in the early part of the present month, but as several of the Reports have not yet been received by Her Majesty's Commissioners, the completion of the entire work has been unexpectedly delayed; the Council, however, unwilling to defer the publication of the Reports already completed, have determined to issue to the subscribers those that have been received up to the present time. When all the Reports are delivered, the parts now about to be issued to subscribers will be exchanged, if uninjured, for the perfect volume, bound or unbound, as desired.

AWARDS OF MERIT.

The following circular has been issued; a copy will be furnished to any exhibitor on application to the Secretary of the Society of Arts.

Society for the Encouragement of Arts, Manufactures,
and Commerce,
John-st., Adelphi, London, W.C., Aug. 1862.

SIR,—The Council of the Society of Arts have decided to invite the opinion of the Jurors, the Commissioners for the Colonies and for Foreign Countries, and the principal Exhibitors at the International Exhibition, on the question

of Awards of Merit in connection with International Exhibitions; and I am directed by the Council of the Society of Arts to transmit to you the accompanying Queries, with a request that you will favour them with your views on the subject, it being the intention of the Council to embody the answers they may receive in a public Report:—

- 1.—Are you of opinion that Awards for Merit, by Medals or otherwise, in International Exhibitions, are desirable?
- 2.—State the reasons for your opinion.
- 3.—Ought Works of Fine Art and Designs to be excluded from the Awards?
- 4.—Can you suggest any better method than the appointment of Jurors for making the Awards?
- 5.—Can you suggest any improvement in the Constitution or proceedings of the Juries?
- 6.—Is any Appeal from the decision of Juries desirable?
- 7.—If you think Awards undesirable, can you suggest any other means by which meritorious productions may be brought to the notice of the public?
- 8.—Have you any further suggestions to offer on the subject?

It is particularly requested that any replies with which you may favour the Council may be sent not later than the 15th of September, and that they may be written on foolscap paper, on one side only, with an inch margin, and numbered corresponding to the number of the questions.

I am, Sir, your obedient servant,

P. LE NEVE FOSTER, *Secretary.*

NOTICES TO INSTITUTIONS.

Those Secretaries of Institutions who have not already forwarded to the Secretary of the Society of Arts copies of their last Annual Reports, are particularly requested to do so.

The Programme of Examinations for 1863 is now ready, and two copies have been sent to each Institution in Union and Local Board. Additional copies may be had gratis on application to the Secretary.

The Papers set at the last Examination are now published in the form of a pamphlet, which may be had of Messrs. Bell and Daldy, Fleet-street. Price Sixpence.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October.

INTERNATIONAL EXHIBITION OF 1862.—VISITS OF SCHOOLS.

The following is a continuation of the Schools reported to Her Majesty's Commissioners as having entered the Building, from 1st to 6th September, 1862 :—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Sept. 1	Hatfield	National	Rev. W. C. Talbot	16	34
" "	Croydon	Archbishop Tenison's	Rev. J. White	18	
" 2	Doctors'-commons ...	Joyes	Subscription	19	445
" "	Charlotte-street, W...	Percy Chapel	Rev. J. B. Heard	32	
" "	Putney	National and Night... ..	Parishioners	285	
" "	Brick Hill-lane, City.	Queenhithe Ward	A. MacDougal, Esq. ...	42	
" "	Leyton, Essex	Sulway House	Dr. Aldom	25	
" "	St. Margaret's, West- minster	National	Rev. M. Davies	22	
" "	Westminster	Wesleyan	J. R. Kay, Esq.	20	
" 3	Kensal-green	National	Alfred Haines, Esq....	47	
" "	Stoke Newington ...	Lancasterian	Committee	41	
" "	Cranford Hall, (Hounslow)	Commercial	Mr. G. Verney... ..	52	
" "	Lime-street, City ...	Langbourn Ward	Committee	60	296
" "	Berkshire	Cookham Dean	Rev. G. H. Wilson ...	30	
" "	Highgate	National	Wm. Ford, Esq.	10	
" "	Croydon	British	Subscription	30	
" "	West Ham	Sunday	F. Fenn, Esq.	12	
" "	Wellesbourne, War- wick	National	Rev. J. Knipe	14	
" 4	Highgate	National	W. Ford, Esq.	13	
" "	Westminster	Wesleyan	J. R. Kay, Esq.	32	
" "	Mortlake	National	Mrs. Bates	72	
" "	Mark House-lane ...	Do.	Mr. Milne... ..	24	
" "	Southwark	Jews' Evening	Baroness de Rothschild	26	995
" "	Richmond	Christ's Chapel	Subscription	20	
" "	West Drayton	National	Rev. R. De Burgh ...	41	
" "	St. Paul's, Covent- garden	Parochial	Chas. Few, Esq.	18	
" "	Westminster	Jews' Free... ..	Samuel Isaacs, Esq....	67	
" "	Greek-street, Soho ...	Do.	Do.	67	
" "	Spitalfields	Jews (Male)	Baroness Rothschild...	70	
" "	Croydon	British	Subscription	16	
" "	St. Mary Abbots, Kensington	National and Industrial	Do.	357	
" "	Kingston-on-Thames.	National	Rev. H. P. Measor ...	34	
" "	Westminster	Wesleyan	J. R. Kay, Esq.	18	995
" "	Snaresbrook	Merchant Seamen's Orphan Asylum.	{ Joseph Adams, Esq., of Limehouse }	120	

VISITS OF WORKMEN.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building from 1st to 6th September, 1862 :—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
Sept. 1	Builders	Camberwell-green	Joseph Thompson, Esq. ...	45
" 2	Seamen	{ H.M.S. Formidable, } Sheerness	{ Vice-Adm. W. J. Hope } { Johnson }	144
" "	Inmates of Workhouse	St. George's, Hanover-sq.	Committee	72
" "	Enniskillen Dragoons	Maidstone, Kent	{ Captain Weatherby and } { Cornet Froom ... }	45
" "	Electro-plate Workers	Woburn-green, Bucks ...	F. Higgins, Esq.	157
" 3	Glass Makers	Birmingham	Chance, Brothers, and Co. ...	680
" "	Brewers	Bath	Pinchin and Co.	70
" "	Sub-marine Cable Makers	Greenwich	Glass, Elliott, and Co....	90
" 4	Seamen	H.M.S. Wizard, Woolwich.	W. Denefield, Esq.	13
" "	Farmers' Labourers	Beaulieu, Hants	Duke of Buccleugh	78
" 5	Brewers	Hornchurch, Essex	Thomas Woodfine, Esq. ...	45
" 6	Builders' Operatives... ..	Union-street, Borough ...	Mr. Thomas Rider	105
" "	Members of Choir	{ Evans' Hotel, Covent- garden... .. }	Mr. Green	27
Total				1,571

MINERAL PRODUCTS OF INDIA.

The following information on this subject is extracted from the Descriptive Catalogue of the contributions from India to the International Exhibition :—

Iron ores are produced in the state of Ulwar. The fuel employed in smelting them is charcoal obtained from the jungle covering the hills near which the ore is found. That obtained from the Dhak tree (*Butea frondosa*) is the best, and costs about 1 rupee for 6 maunds. To smelt 16 maunds of ore, 24 maunds of charcoal are required, and this will yield 4 maunds of iron, valued at 3 rupees per maund. The details are as follows :—16 maunds of ore, including carriage, Rs. 1-8; 24 maunds of charcoal, Rs. 4; labour, Rs. 4-12; contingencies, Rs. 0-8—total, 11-8.

An abundance of ironstone is found in the district of Sumbulpore, and it is plentiful in the Cuttack tributary states of Talchere, Dhenkanal, Pal-Lahara, and Ungool, and indeed throughout the hilly country bordering the settled districts of this province on the north-west. In Sumbulpore, according to Dr. Shortt, of the Madras army, who passed through that district in 1855, the crude iron is sold at 1 anna per seer, which is equivalent to about three-fourths of a penny per English lb. From a report by the same observer, the following information relative to the method of smelting is gathered. No flux is used; the broken ironstone is mixed with charcoal, which can be prepared in any required quantity on the spot, and the mixture is then, probably in alternate layers, put into the furnace,—a kiln in miniature, standing about four feet high, and made of clay. The top is open, and the bottom and sides thoroughly closed. The fire is maintained by an artificial blast, introduced through a fire-clay pipe, which is sealed up with clay after the insertion of the nozzle of the bellows. The slag escapes, or more properly is raked out, through an aperture made in the ground, and which runs up into the centre of the furnace base. Three men—one to serve the fire, and two to work the bellows, are required to tend each furnace. Nearer home, this ore abounds, as has been observed, in Ungool, Talchere, Pal-Lahara, and Dhenkanal. The specimens sent are from Talchere and Dhenkanal. These are a red-ochry ore, said to produce very excellent metal, without the aid of a flux. The method of smelting here is very similar to that already described, the main difference being that the slag is passed out through an arched opening in the base of the furnace. The charcoal used is made from the *Sal* or *Shorea Robusta*. Limestone in calcareous nodules is abundant on the spot, in Ungool at least, but is nowhere used in smelting. The price of the crude iron in Ungool is a trifle less than 1 anna per seer. It is, as might be expected, mixed with impurities. A specimen of the Ungool ore, taken from the ground where it had lain exposed to sun and rain, gave 66 per cent. of teroxide of iron, equal to 46 per cent. of metallic iron. A sample from Pal-Lahara gave 60½ per cent. of the protoxide of iron, equivalent to 47 per cent of metal. The results are given on the authority of Mr. Piddington, late curator of Economic Geology, Calcutta. The native method of smelting is, however, rude and wasteful.

The part of the Vhyudhya Hills forming the southern portions of Shahabad and of Mirzapore, north and north-west of the Soane River, together with Mirzapore, south of the Soane, Rewah, Palamow, and, in fact, the whole chain and spurs of the Vhyudhya range in this neighbourhood, is full of mineral wealth of various kinds, and will doubtless, in the course of a few years, when railways run down the valley of the Soane, connecting the Gangetic valley with that of the Nerbuddah, be found to yield products of immense value. Abundant quarries of the *per* and *prot* oxides of iron, as also of the sulphate of iron, abound in the most accessible portions of the Kymore range. The Kymore range is the north-easterly spur of the Vhyudhya range, and fills all Southern Mirzapore and Shahabad. Most of the ores are peculiarly rich in

metal, some of them even yielding 70 and 75 per cent. of pig iron, but without accessible coal they are comparatively useless. Considerable quantities of iron, and that some of the best in India, are annually produced in Palamow, Rewah, Bidjuggur, and Singrowlie. The iron from the latter place in particular bears a high character in the market, being tough, flexible and easily worked, while English iron having originally been smelted from an inferior ore (the clay ironstone) and with mineral coal, is almost unworkable by native blacksmiths. The greater portion of the ores, which are spread very largely over the tablelands of the Kymore plateau and in the face of its precipices, are found on what is generally supposed to be the old red sandstone superlying mountain, now fossiliferous limestone; but the best authorities have not decided yet the age of those rocks, the generally assumed theory being that they belong to the "old red sandstone." The whole of the Kymore range thus appears to consist of old red sandstone rock, superlying mountain limestone of indefinite thickness, while the jasper rock and trap rock, cropping out occasionally in the Soane, near the base of the main spur, which is the Rohtas range (a minor spur of the Kymore range), would lead us to suppose that stratum was the underlying one of the mountain limestone. Again, at Chynerpore and at Sonar, near Sasseram, and in other localities, igneous action appears to have taken place upon the sandstone, more or less, rendering it intensely hard and flinty, while interstices here and there are filled with sulphate of iron and a substance resembling iron slag, almost as hard and heavy as iron itself. A little further south, about seven miles from the southern base of the Sasseram spur, an offshoot of the Rohtas range is found in the granite rocks of Bunmonee, cropping up above the surface to heights varying from one to 60 or 70 feet. These rocks are full of fragments of felspar, hornblende, and quartz, in large and broken masses, and would appear to have been mixed with the great mass while in a soft and ductile state. The base of the whole is a coarse granite. Thus we have three different bases cropping out, which must either wholly or in part underlie the sandstone; 1st, the jasper and trap rock in the Soane; the semi-igneous rock at Chynerpore, and the wholly igneous one of Sonar; and, lastly, the conglomerate granite rocks of Bunmonee; while up to the present time, the mountain limestone, which is the visible base, leaves us in the dark as to its origin by a total absence of fossil remains.

Although there is abundance of mineral coal in South Mirzapore, in Palamow, Singrowlie, and Rewah, native smelters use only wood charcoal prepared by themselves, and as their furnaces and tools are small, they can all be constructed and arranged by one man in half a day; this fuel and ore are close at hand to the furnace, the latter being re-made further in the jungle to suit their main requirements, while the wretched hut in which they live may well be prepared in the half-day remaining. The process employed by the smelters is a very simple one indeed. The furnace is built of clay, something like a small hollow cone, larger in the middle, and tapering up to the chimney and down to the blow hole, with a table at the top formed of bamboos, covered with clay, and of about 2 to 2½ superficial feet in area. The internal area of the furnace is not more than 2 to 2½ cubic feet, and is not more than 2½ to 3 feet in height. There are two round calabashes with a skin covering, and a string connected with a flexible bamboo. The smelter treads upon the skin covering with a sort of dancing motion, raising his feet in a peculiar manner alternately, exposing and closing the centre hole in the skin cover of the calabash, and at the same time holding on by his hand to the two bamboos right and left of the furnace, steadying himself, and alternately raising and depressing the string connected with the flap of the calabash with the same motion, occasionally feeding ore and charcoal from the table, with a small wooden scraper, which he holds at the same time in his right hand. Two hollow bamboos cased with clay, each connected with its own calabash, and meeting at the nozzles, which are brought into one

focus in the luted fire-hole, constitute a primitive and powerful bellows, causing a constant and strong stream of air for the blast, and thus keeping the half-melted metal and charcoal in a bright ignition. As the charge falls, more ore and fuel is pushed in from the table, the dancing motion and consequent blast being constant. To each furnace there are two men, and it is kept in full play all day. In each day, if the smelters have wives and children to break up the ore in $\frac{1}{2}$ or $\frac{1}{4}$ -inch cubes, and bring charcoal, they will charge the furnace four times, and the day's work will be four or five malleable pigs of 2 to 2½ seers each, or in all 12 annas to a rupee's worth of iron. They employ no flux, and the slag runs off first in pipe-like lumps. The furnace is emptied at each charge. The metal never runs liquid from the furnace, but falls to the bottom, below the blast tube, from whence it is taken in a flaming mass by a pair of iron tongs, and which incandescent mass is hammered on a hard stone, or, if the smelter be rather rich, on a rough anvil, into a double-wedge shaped pig, and so on *ad infinitum*, the labour being divided between the smelter and his family, who think themselves fortunate if they can earn 1½ anna per head. Some years ago, Mr. Bingham, hon. assist. magistrate of Chynepore, erected a small brick furnace and used three large blacksmith's bellows, using mineral coal and limestone flux, but although he smelted the iron, yet from want of acquaintance with the *modus operandi*, he ran off metal slag and flux in one homogeneous mass, so that the pigs were of no value. He saw, however, enough to convince him of the extreme richness of the ores. He had bar iron forged under the hammer, which was tested against English rolled bar iron, and found superior in tenacity and strength, but more flexible. Major John Laughton, of the Bengal Engineers, proposed its use for lattice bridges on the Grand Trunk Road, but no further action was taken, nor can any great action be taken till railways or canals bring the coal to the ore, or the ore to the coal, and then the valleys of the Soane, Koyle, and Nerbudda will soon become the Crewe and Wolverhampton of India. The cost of the ore would be merely nominal, probably not more than two per cent. upon the cost of quarrying; and the ores being all above ground, would reduce the cost of quarrying to a minimum. One rupee per ton for royalty and cost of quarrying would give an ample margin for all contingencies, allowing rates of labour to remain as at present. Charcoal, as at present used by native smelters, may be obtained at 10 or 11 maunds per rupee, say 2½ to 3 rupees per ton, in the forest, to which, of course, must be added cost of carriage to site. Native charcoal is, however, made in open kilns in a most wasteful manner. Burnt in close kilns, more than double the quantity, and that of a much better quality, would be obtained, while the tar and wood vinegar obtained at the same time would materially diminish the cost.

Iron ore (Dhaoo) is produced in the land lying between Mouzah "Sathoo Nuiwaree" of the Gwalior District and "Punehar," i.e., about four cross (eight miles) from east to west, and one cross (two miles) north to south; also in the hills adjoining. In that neighbourhood people dig for the ore; after digging 20 cubits deep and 50 yards square, a description of earth called dhaoo (the ore), which is like small stones, but very soft, is found. This earth is loaded on bullocks, and taken to "Dhoa" and "Bagrowlee" and other places, where it is smelted and iron made from it.

The cost of digging and refining the ore is 12 annas per maund. A piece of iron about 20 seers in weight is made in three hours, at the cost of 12 annas. The price in the bazaar of 20 seers of iron is 14 annas, thus a profit of two annas is derived by the manufacturer.

The ore actually worked at Tendookhera, in the Nurginpoor district, is a large vein or lode in the limestone schist formation of the Indian Geological Survey, and the only rock in its immediate vicinity is hard grey and blue crystalline limestone. It occurs to the north of the Nerbudda in the open flat country between the river and the Vhyudhya Hills. Only one mine is worked at present,

but ore of a similar quality has been found at one or two other places in the neighbourhood. The only fuel used is charcoal, which is of very fair quality. Some coal mines also are situated at Mohpance, not far from Tendookhera. The distance of fuel from the mines is from five to ten miles. The iron is smelted in small clay furnaces, blown by goat-skin bellows, worked by the hand. It is obtained in small lumps or blooms called "cutcha," or raw iron, and is afterwards re-heated and hammered, and then sold as "pucka," or finished iron. Intermixed with the raw iron as it comes from the furnace, is a sort of crude steel, which is carefully selected and used for the manufacture of tools and agricultural implements. The ore is largely smelted by the natives at the town of Tendookhera, about two miles from the mines, where, during the eight dry months of the year, about sixty furnaces are worked, but the mines having now been leased to the Nerbudda Coal and Iron Company formed in London, they will shortly commence work on a larger scale with European appliances. About 5 tons 3 cwt. of iron ore, and 5 tons 12 cwt. of charcoal, are used for the manufacture of one ton of "pucka," or finished iron. The ore contains upon an average about 40 per cent. of iron; it is of a calcareous nature, very fusible, and somewhat resembles the ores of the forest of Dean. The ore is obtained by means of pits sunk from 30 to 40 feet, through the alluvium of the valley, to the ore. They are washed in during the rains, and require to be re-sunk yearly. The iron is obtained at a very small cost, as the Government do not demand at present any royalty from the smelters. The fuel or charcoal is sold at from 3 to 3½ buffalo-loads per rupee, which is equivalent to about 8s. per ton. The pucka iron sells at from 5 to 6 rupees, 12 shillings, per goan or bullock-load of three maunds, equal to 24 bundles, or from £4 10s. to £5 8s. per ton. The iron is sent by bullock carts and buffalos to all parts of any consequence within 100 miles, and in some instances is sent even 200 and 250 miles. From the iron of these mines, several years ago, a very good suspension bridge was built near Saugor.

The Agureea mines, in Jubbulpoor, are situated on a hill consisting of iron ore found at 1½ feet from the surface, and extending over an area of about 60,000 yards square and 30 feet deep. The ore exists in thin flakes of a grey iron colour and metallic lustre. The nature of fuel used is common wood charcoal, and for refining the metal, bamboo charcoal; the fuel is brought from a distance of about five miles from the mines. The ore and charcoal are thrown in small quantities every half hour into an earthen furnace 5 feet high and 2 feet square; a part of the bottom of the furnace is filled with fuel only; this being kindled, a pair of bellows is applied to raise the heat, and a passage made at the side of the furnace for the melted metal to run out. Four maunds (320 lbs.) of ore and 2½ maunds of charcoal are daily used in a furnace; the fuel is used in the proportion of five-eighths or 62 per cent. of the ore for smelting, and one-fifth more for refining the metal. A furnace furnishes daily two maunds (160 lbs.) or 50 per cent. of the crude iron from four maunds of the ore; this, when forged, yields 30 seers, or nearly 19 per cent. of wrought iron. The ore is simply dug out with pickaxes; it costs 6 pie per maund for excavating and carrying to the furnace. The fuel or charcoal costs Rs. 1-1-6 per maund of wrought iron. The entire cost of the pure metal obtained amounts to Rs. 1-13 per maund, including labour and materials. The ore is generally sold at the works and conveyed on bullocks to different markets. When brought to Jubbulpoor, the nearest market, it costs 2 annas 8 pie per maund, exclusive of duty. Agureea is not far from the proposed branch line of the East Indian Railway to Allahabad.

Granulated iron is found lying on the surface of almost all the high grounds in Chota Nagpore; where it lies the soil is only surface, the rocks primary formation.

Iron is found in considerable quantity, and of a very fine description (the magnetic), closely resembling the Swedish, in the Himalayas, about 30 miles north-east of Dhurmsala,

in the Kangra district; close to the sanatorium of Dalhousie; in the native states of Maudi and Kotkai; in the Sulyamani range near Kolachi, on the western frontier of the Punjab. In all these places mines are worked, but iron is also to be found in the Salt range, in the Afidi hills to the west of the Peshawur, and the Mewatti hills of the Goorgaon district. But there is one great obstacle to the successful working of iron mines in all these localities, viz., the absence of coal. In the year 1858, sixty bars of Kangra iron were sent to England, in order to ascertain the quality of the metal and its value in the European market. On being tested at the Atlas works of Messrs. Sharp, Stewart, and Co., of Manchester, while the best English iron yielded at a pressure of about 56,000 lbs. to the square inch, the Kangra iron, in the state in which it was received, required a force of 61,300 lbs. per square inch to break it; and, after being hammered in Manchester, sustained a pressure of 71,800 lbs. The quality was considered "equal to that of Yorkshire iron." At present, however, its cost in Kangra, about 30 miles from the mines, is no less than £14 a ton.

Lead is found in Ragoon, and was exported, in the year 1860-61, to the value of £12,000.

A plumbago mine was discovered by Dr. W. J. Thornton, Civil Assistant-Surgeon, Goorgaon, in October, 1861. The mineral is found in masses of variable sizes, and in general quite detached; though, in some cases, the rock all round is full of plumbago mixed with finely divided micaceous particles. Provision has been made in the Budget of 1862-63 to admit of further inquiries and examination of the deposits being carried on.

Sulphuret of antimony is said to be found in the Salt range near the Keura salt mine. Vast quantities of antimony have been found by Major Hay in the Himalayan ranges of Spite. Trisulphuret of antimony is imported from Cabul, and is said to be found in small quantities in the Salt range.

Gold is found in the beds of rivers in Purnalia, Chota Nagpore, and in the sands of the Dirjmo River, Luckimpore. It is found in minute scales in the sandstone of the Salt range, a lower range of hills running parallel to the Himalayan chain, between the rivers Indus and Jhelum; it is also found in small quantities in the sands of the Indus, Jhelum, Beas, and Sutlej; but the operation of gold-washing is not very remunerative, amounting on an average to not more than from 8d. to 6d. a day, and the proceeds of the annual lease of gold-washing amounted last year to but £84. Gold dust is also imported from Elaché, in Khoktan.

Gold dust is extracted from sand in the beds of rivers in Maunbhoom and Palamow, and other places, but not in large quantities.

Copper is found at Ulwar; also at Debrooghur and Sebsaugor, where the fuel used for smelting is charcoal made from the extensive forests in the immediate vicinity of the mines and works in Landoo, in Dalbhoom, and Singbhoom, in the south-west frontier of Bengal. The distance of the works from Calcutta is about 140 miles, and they may be reached *via* Midnapore or *via* Raneeungee and Furulia.

Messrs. Phillips and Darlington's analysis of specimens gives:—Oxide of copper, carbonic acid, water, oxide of iron and alumina, lime, sulphur, silicious gangue, silver, and arsenic. By assay the sample gave good copper 31½ per cent. and silver 2 oz. 5 dwts. 17 grs. per ton of ore.

The quality of the copper is thus reported on by Colonel Baird Smith, C.B., Mint Master of Calcutta, No. 481 of 1859:—Report on copper, the produce of ore raised from the copper mines of Singbhoom in the south-west frontier. Three slabs weighing about 139 lbs. These were submitted to a lamination, and proved to be well suited in all respects for purposes of coinage. The quality of this metal is excellent, being scarcely inferior to the best, equal to the average, and decidedly superior to several shipments of imported copper.

Coal is found in Ungool, and may exist in different

localities throughout the immense extent of wild and jungly country comprised in what are called the "Garjats," or Hill States, forming part of this province. Within the limits of the Sumbulpore district, extensive veins are said to exist. A careful, though unprofessional observer, writing in 1855, states that about sixty miles north-west of Sumbulpore, there is such a bed of coal, while, in other localities visited by him, the country around for miles indicated the existence of coal deposits extending up the "Ebe," a tributary of the Mahanuddy. Strata of from 14 to 22 feet were to be seen forming the banks of a nullah, while drifting down the river were masses of coal, which ignited readily and burnt well. With regard to the coal, so called, found nearer Cuttack, and mainly in the tributary state of Talcheer, we have fuller particulars, for not only has the vein or field been frequently visited by Europeans, but samples have been analytically examined. The value of this mineral, if found here in sufficient quantity and of proper quality, would, of course, be infinitely greater than that found in Sumbulpore, because of the comparative facilities afforded for transport to the sea, by river carriage. The best coal, such as it is, in "Talcheer," is to be found at and in the vicinity of "Gopaulpershad," a village in the above-mentioned estate. For four or five miles above this place, the alleged coal deposit crops out along the bank of a nullah, here and there forming abrupt cliffs 20 to 25 feet high. Blocks of coal are also found scattered about in the circumjacent forest. This bed is said to be of considerable extent, running far into the Government estate of Ungool. There is also another field reported to exist in the estate itself. Two specimens of "Talcheer" coal, one of them from "Gopaulpershad," were submitted for examination to the curator of Economic Geology at Calcutta, in 1855, and, allowing for the rejection of what was wholly shale, the results were for *picked* "Gopaulpershad" coal:—

Specific gravity	1.42
Gaseous matter	36.90
Water	3.25
Carbon	51.75
Ash (fawn-coloured)	8.10

For the second specimen, which was not absolutely shale, the results were as follow:—

Gaseous matter	17.75
Water	14.37
Carbon	35.63
Ash	32.25

It is only fair, however, to state, that the results of these analyses, while they are the most recent, are the most favourable, at least the first, which have been obtained for Cuttack coal; and, moreover, that specimens taken from the same locality had been previously submitted to professional examination, and tested both in the crucible and the steam engine, with very unfavourable results; and it must be further added, that the results of a geological survey of the so-called "Talcheer" coal fields, made in the season of 1855-56, are decidedly against the discovery of any workable coal, in "Talcheer" at least, the geological conformation coexisting commonly with coal deposits being found to be wanting.

The coal mines in Nursingpore are entirely confined to the south side of the Nerbudda Valley, where they form a strip or band of irregular width, along the foot of the Puchmuree hills. Thin seams of inferior coal, from 18 inches to 3 feet thick, have been found also on the Shere River, but the only workable seams are at Mohpanee, on the Seeta-Rewah river. At this point three seams, respectively 10 feet, 6 feet, and 3 feet 6 inches thick, are found. The coal is of very fair quality, resembling that of Bengal, and small quantities that have been used experimentally by the Great Indian Peninsular Railway Company and the Indian navy, have been very favourably reported of. The mines have been leased to the Nerbudda Coal and Iron Company, and will shortly be worked.

Kurhurbalee, in the district of Hazareebaugh, contains several valuable seams of coal varying from 7 to 16 feet in thickness, which are worked by the East Indian Railway Company. In 1860-61, 275,256 maunds of coal were raised. This coal is superior to any of the coals raised elsewhere in Bengal. A comparative trial in the locomotives of the East Indian Railway, continued for three months, showed a superiority, amounting to 13 per cent., over the good steam coal of the Raniganj field. Kasta is situated to the north of the Adjai River, in the extreme north of the great Raniganj field. Here an immense seam of upwards of 30 feet in thickness crops to-day, and is worked in open quarries. The lower 11½ feet of this are of superior quality. 11,892 maunds were raised in 1860-61. It is less accessible than other collieries. At Chokidanga, the most northerly of these, a fine seam of 15½ feet is worked. The average outturn of three years has been 360,000 maunds. At Toposi, a seam (higher in the series of rocks) of 22 feet is worked. In 1860-61, 300,000 maunds were raised. Bansra is another seam still higher in the series, of about 7 feet in thickness. In 1860-61, 70,000 maunds were raised. At Mangalpur, a long established colliery, a seam of 15½ feet, including 9 inches of shale, is worked, yielding 1,000,000 maunds, in 1860-61. The Chokidanga, Toposi, Bansra, Mangalpur, Babūsol, and Harispur collieries are all on the Singarun, a feeder of the Damūda River, and in the Eastern portion of the great Raniganj coal field. Babūsol and Madhubpur (or Harispur) are situated in the lower portion of the Singarun stream, and are the most eastern collieries in the field. From Babūsol 84,000 maunds, and from Harispur 440,000 maunds, were raised, in 1860-61. Rogonathchuk is on the banks of the Damūda river, and is one of the oldest collieries in the field. The bed is 12½ feet thick, and yielded, in 1860-61, 300,000 maunds of coal. The most extensive workings at Raniganj are near the Damūda river. The entire seam is 13 feet in thickness, divided by a band of shale into two seams of 9 ft. and 3 ft. The Raniganj workings yielded 1,600,000 maunds in 1860-61. Bhangaband is in the same neighbourhood, and yielded, in 1860-61, 250,000 maunds. Banali is a recently opened colliery, where a fine seam of 12 feet is worked at a depth of 43 feet below the surface. Futtehpur is on the Grand Trunk road. The bed is of 10 feet in thickness, and of excellent quality. In 1860-61, 150,000 maunds were raised. The Rogonathchuk, Raniganj, Bhangaband, Banali, and Futtehpur collieries are in the middle of the Raniganj field. The Hattinal colliery is in the west of the Raniganj field, near the junction of the Barābar and Damūda. The seam is 8½ feet thick, the pits only 42 feet, the outturn in 1860-61, 200,000 maunds. Chinakūri (Cheenakooree) is close to Hattinal, and coal has long been worked there. In 1860-61, its outturn was 3,290,000 maunds. Dūmarkūnda lies to the west of the Barākar, and is the most westerly colliery now worked in the field. These three collieries, Chinakūri, Hattinal, and Dūmarkūnda are all in the western portion of the Raniganj coal field. At Panchbyni a 7 feet seam has been worked to some extent in open quarries. At Chilgo a 5 feet seam yielded 20,000 maunds in 1860-61. At Oormoo, two seams of 7 feet and 3 feet produced 30,000 maunds in 1860-61, and at Bankijora, a thick bed of 19 feet, worked in open quarries, produced 30,000 maunds. The Chilgo, Oormoo, and Bankijora collieries are often spoken of as the Alubera collieries. At Bhorah, a thick seam of 17 feet produced, in 1860-61, 700,000 maunds. This colliery is only 20 miles from the Ganges. It is worked in open quarries. These collieries are all in the Rajmahal hills. That of Panchbyni is on the Brahmini stream, at the extreme south of the hills. The Alubera collieries are near the Bansloi stream in the centre of the hills; and the Bhorah colliery to the north end.

The following is the general classification of all these coals, with the names of the proprietors, and arranged in the order of the relative amounts of fixed carbon which they contain, which may be taken as a fair index of their relative value as fuel.

NAMES OF COLLIERIES.	Thickness of seam in feet.	COMPOSITION OF COAL.			PROPRIETORS.
		Carbon.	Volatile matter.	Ash.	
Kurhurbalee...	7 to 16	66·70	24·80	8·45	East Indian Railway Company.
Futtehpur	10	63·80	25·00	11·20	Messrs. Apar and Co.
Dumarkūnda	10	62·40	22·60	15·00	Bengal Coal Company.
Kasta	30	61·40	28·00	10·60	East Indian Coal Company, and Messrs. Nicol & Sage.
Chokidanga ...	15½	56·80	34·00	9·20	Messrs. Nicol and Sage.
Chinakūri	10½	53·20	35·50	11·30	Bengal Coal Company.
Hattinal	11	52·60	33·00	14·40	Beerbhoom Coal Company.
Madubpur	17	51·10	35·40	13·50	Bengal Coal Company.
(Harispur)					
Raniganj	9	50·80	36·00	13·20	Do. do.
Do.	3	50·30	36·30	13·40	Do. do.
Toposi	22	49·20	35·40	15·40	East Indian Coal Company.
Bansra	13	47·00	40·00	13·00	Do. do.
Rogonathchuk. 10½	46·90	35·00	18·10		Beerbhoom Coal Company.
Babūsol	17	46·00	35·40	18·60	Bengal Coal Company.
Chilgo	5	45·50	43·50	11·00	Messrs. Eaton & Browning.
Oormoo	7 & 3	45·00	44·60	10·40	Do. do.
Panchbyni	7	44·20	34·10	21·70	Messrs. Mackey and Co.
Mangalpur	15½	43·90	38·40	17·70	Beerbhoom Coal Company.
Bankijora	19	43·50	42·00	14·50	Messrs. Eaton & Browning.
Banali	12	42·60	44·20	13·20	Beerbhoom Coal Company.
Bhangaband	7	40·30	28·40	31·30	Bengal Coal Company.
Bhorah	17	25·20	7·20	37·60	East Indian Railway Company.

If, on the other hand, these coals were arranged according to the relative amounts of ash in each, which for many purposes is a more useful classification, they would stand as follows:—

	Amount of Ash.		Amount of Ash.
Kurhurbalee	8·45	Madubpur (Harispur) ...	13·50
Chokidanga	9·20	Hattinal	14·40
Oormoo	10·45	Bankijora	14·50
Kasta	10·60	Dumarkūnda	15·00
Chilgo	11·00	Toposi	15·40
Futtehpur	11·20	Mangalpur	17·70
Chinakūri	11·30	Rogonathchuk	18·10
Bansra	13·00	Babūsol	18·60
Banali	13·20	Panchbyni	21·70
Raniganj (average of two seams)	13·30	Bhangaband	31·30
		Bhorah	37·60

The coals in the lower portion of the Damūda coal field are very frequently found intersected with basaltic trap, and in most cases the structure of the coal is entirely changed. The coal has become beautifully prismatic or columnar, and this may be seen over large areas.

Chalk is abundantly dug in the limestone range in the valley of the Soane, and it varies in colour from yellow, when it is starred with oxide of iron, to pure white; also from the dense hard substance of bluish white stone, which has to be crushed and re-made by water, to the pure white chalks. Quantities of this mineral are exported to the river markets on the Ganges. The best quality is worth about £1 10s. to £2 per ton on the banks of the Soane.

The sandstones of the Shahabad range have a high commercial value at Chunar and Mirzapore, being used as flagstones, and for ornamental purposes. The stones at those places owe their advantage to the proximity of the Ganges, which affords an easy river carriage; otherwise they are the worst and most destructible description of stone in the range. The millstones of Chynepore, Sasseram, Tilowlhoo (Ackbarpore perhaps may also be added), are famous, but must always be dear in a distant market for want of river carriage. The Soane causeway and the Koylwan railway bridge are built of the dense sandstone of Sasseram, while even little quantities are found in the higher portions of the range towards Rohtas. The best stone, while easily workable, is almost as hard as granite, and may be had of any colour, viz., white, crystalline, blue, grey, and all shades to a dark red.

There is close to Jubulpore a range of low hills within a circumference of about ten miles, interspersed with masses of limestone both above and below the surface.

The fuel generally used and most available for burning the lime is brushwood. It is cut and brought from a distance of seven or eight miles. The stone is broken into fragments of 6 to 12 inches in size, then piled like a dome over a hole of about nine feet diameter dug in the ground, and a passage left for introducing the fuel. The kiln is kept burning continually for the whole of the day, and the lime removed on the following morning. The fuel is used in the proportion of 40 maunds to every 75 maunds of lime-stone. Seventy-five maunds of the stone yield about 50 maunds of well-burnt lime. The stone is simply collected and broken up by manual labour, and the cost of collecting and putting it in the kiln amounts to three rupees for every 100 maunds of lime. The fuel costs from five to eight rupees for every hundred maunds of lime. The entire cost of preparing the lime varies from 8 to 10 rupees per 100 maunds. The lime is at present only used in the city and station of Jubbulpore, and the locality is leased by government to a farmer from year to year for a trifling sum; but the railway works shortly to commence will enhance its value. The hills are conveniently situated both as regards the line of railway to Bombay and that to Mirzapore.

The so-called mountain limestone underlies the whole of the Kymore range in Shahabad, and it also shows itself along the valley of the Soane, as far at least as Mungeysur peak in Mirzapore. In some parts, as in Rohtas, it crops up boldly to 200 or 300 feet, forming a sloping base to the precipitous sandstone rock. In these places, it appears there are three well-defined strata, viz., an upper one of a yellowish-blue mixed with disintegrated sandstone, sulphate of iron, and chalk—all in thin plates. Below that a more bluish grey limestone with occasional calc spar crystals, but generally of the same nature as a German lithographic stone. Stone for lithographic purposes was made from it, and used in the office of the Surveyor-General. The first stone was used in the press of Shah Kubeeroodeen Ahmed, of Sasseram. It answered admirably for the purpose, but the stone must be freshly quarried or it chips, as after exposure to the air it grows intensely hard, and could then only be sawn into shape. Outside stone of limited sizes can only be obtained, owing to the ages of *débris* and decay which cover the main strata, but after quarrying some feet into the living rock, it was established that lithographic stones of any size could be obtained. Under the aforesaid strata lies a very dense bluish-grey limestone, mixed with veins of calc spar. It is not used by native lime-burners as being untractable. This would be an almost indestructible building or flooring stone from its great hardness, much harder than granite, and approaching to porphyry. It may be had in large blocks, and, if sawn into slabs, would be a very handsome building stone, bluish-grey with white streaks, and moreover it would probably make a superior kind of lime. Immense quantities of lime are made from the quarries of the western bank of the Soane, and exported down the Soane and the Ganges as far as Monghyr. Perhaps 300,000 to 400,000 tons are made annually, and the material is inexhaustible. The same limestone rock crops out on the northern face of the range at intervals, between the Soane river and Mirzapore; and again, especially in the singular and interesting limestone caverns of Goopteswar, in the valley of the Doorgowtee River, at Beetree Band, in Khawah Koh at Mussay, on the Sooreh River and near Mirzapore. With canals and tramways, these quarries could supply all Northern India with the finest lime in the world. The cost of the lime at these quarries varies from 6 to 16 rupees per 100 maunds, or say 5 to 14 shillings per ton. The present system of lime-burning is a very imperfect one, and indeed only suited to native wants, but with European supervision, although the material could not perhaps be produced cheaper, it could be produced with much more certainty and evenness in quality. The great fault of these limes in the market is their excessive adulteration with chalk, white clay (disintegrated limestone), and wood ashes, but the ores are pure

and, when burnt according to European practice, leave nothing to be desired.

Marble is to be found at Bhera Ghât, on the Nerbudda, near Jubbulpore, on the line of the railway to Bombay. It is plentiful and easily accessible. It has been used in a limited degree at Jubbulpore, sometimes to make lime, and other times for metalling roads. It is made up into images by natives, but does not take a good polish. A block was sent to the Paris Exhibition, and pronounced to be equal to Italian marble for statuary purposes.

Grey slate is found at Nilgiri, and is used for the purpose of making the marks on the forehead, nose, arms, and breast, more particularly affected by Hindoo devotees, and also by high class natives in the Madras Presidency, and by Stirling called "Meerchaum."

The Moongnee stone, apparently a kind of chloride slate, is, according to locally received accounts, when freshly quarried, comparatively soft and easily workable, but by long weathering becomes highly indurated, black, and bright. It comes from the hill state of "Nilgiri," in Orissa, in the Cuttack district, where extensive quarries are said to exist. This stone is used principally for the manufacture of utensils. Idols are also made of it, and if the popular assertion that it is the true "Moongnee" be accepted, this stone is that on which the finest specimens of native sculpture extant in the province are executed. It is probable, however, that "Moongnee" is a general term confined, not to one species of stone, but applying to several.

"Kharee" stone, used, among other purposes, for the manufacture of pencils and balls for writing on the ground or floor, being so used in all rural schools, and by native accountants, is found in the same district.

The supply of petroleum in Burmah is unlimited, but the price is high, it being a close monopoly of the King of Burmah.

That found at Akyab, is used by the natives for burning, by Europeans for medical purposes, by both for varnish and to preserve wood; it is also put on the bottoms of boats, being an excellent preservative of wood from insects and worms. In the island of Ramree there are 13 wells, in Cheduba 22 wells. Each well produces about two maunds per season, the aggregate produce of all the wells being 70 maunds per annum. The produce might be increased some 10 or 20 maunds by digging more wells. No petroleum is exported from the province. It is thick and dark coloured.

FLAX AND ITS PRODUCTS.

The readers of the *Journal* will recollect that letters from time to time, under this heading, have appeared in its columns, written by Mr. Wm. Charley, one of the Jurors of the Exhibition of 1851. The information he then derived, combined with the experience acquired by long residence near Belfast, the linen capital of Ireland, enabled him, in the year following, to comply with the request of the Society to prepare a few papers on the subject for publication in the *Journal*. Various causes led to the series being somewhat delayed, and spread over several years, between 1853 and 1861. They were, however prepared with the intention of future arrangement in a regular form.

Mr. Charley has now collected these letters into a volume, enlarging and revising them in accordance with the advance of knowledge on the subject down to the present time, forming a complete "Hand-book" of the Flax Industry.

The want of a book that would give all the interesting particulars of the history, recent progress, and general management of flax, has been admitted. The object of the present little work is to supply that want.

Mr. Charley, in his preface says:—

"In several of the British colonies, as well as in many

parts of Great Britain and Ireland, there is a great desire among the agricultural community for information regarding the flax crop, and I therefore enter very fully into the details of its cultivation.

"The papers published in the *Journal of the Society of Arts* form the ground-work of the present publication. They have been re-arranged, enlarged, and revised, so as to bring everything, as nearly as possible, down to the present time; and an Appendix is added, which contains much useful information, especially on the subject of foreign tariffs."

The work is published by Messrs. Bell and Daldy, 186, Fleet-street.

STATISTICS OF WRECKS.

The Board of Trade return of the wrecks and casualties which occurred on and near the coasts of the United Kingdom in 1861 has just been published. From this report it appears that the number of casualties is greater than that reported in any of the preceding nine years, and 261 in excess of the annual average of the last six years. The numbers (exclusive of collisions) were, in 1857, 866; in 1858, 869; in 1859, 1,067; in 1860, 1,081; and in 1861, 1,171; and the increase is ascribed to a great extent to the gales of January, February, and November, in which alone there were 465 casualties (exclusive of collisions). The number of collisions, again, though slightly in excess of 1860, is under the number of 1859, the three years 1859, 1860, and 1861 having the respective numbers 349, 298, and 323; and on the whole the increase in the number of collisions is not proportionately so great as the increase of other casualties. In the number of lives lost there is a large increase as compared with last year, caused by the gales of January, February, and November, which increased the number of casualties. In 1860 there were 536, while in 1861 there were 884, but this number is less than the numbers in 1854 and 1859. The comparatively small number of lives lost in 1860 and 1861 is owing chiefly to the absence of the loss of any large passenger ship on the coasts. From a table appended, showing the force of the wind, it appears that nearly one-half of these casualties happened with the wind at and under force 8, or "fresh gale," or under circumstances in which a ship, if seaworthy, and properly manned and sound, ought to be able to keep the sea. Appended to the report are various other tables comparing past years with the present, and classifying the casualties in various ways. The most important of these shows the geographical distribution of the wrecks. According to this the three most fatal districts are from the Fern Islands to Flamborough Head, from Flamborough Head to North Foreland, and Skerries and Lambay to Fair Head and the Mull of Cantire. In the former district, in 1861, there were 40 ships wrecked, with a tonnage of 5,129, and 244 men; and the loss was, totally wrecked, 31; partially, 9; and the number of lives lost, 147. In the second district the figures are—ships, 24; tonnage, 3,998; men, 189; total wrecks, 18; partial, 6; lives lost, 111. And in the third—ships, 28; tonnage, 5,832; men, 216; total wrecks, 22; partial, 6; lives lost, 144. This, in the first two districts, is greatly above the average of the last 12 years, which, for the one district, is 55 10-12, and the other 89; but this is probably accounted for by the increase of the number of casualties to ships of the collier class, through the prevalence of north and east to south-east winds. In the third district the average of the 12 years, 133 1-12, is but slightly exceeded. The number of lifeboats under the management of the National Lifeboat Institution has increased from 124 in 1856 to 179 in 1861, and as compared with 1860 the increase is six. The number of lifeboats under other management was 59 as compared with 63 in 1860. Out of the whole number, 106 are subsidized by the Board of Trade direct, without the intervention of the institution; and of those remaining 14 are maintained by the institution, and

54 by local bodies. During last year the Board of Trade and Admiralty have supplied the crews of some of the Coast-guard stations with Captain Ward's life-belts and life-lines, the use of which will diminish the risk they run in putting to sea. To the mortar and rocket apparatus and lifeboats, as means of saving life, great credit is given; and from a tabular statement of the lives saved by assistance from the coast during the last seven years, it appears that the numbers have increased from 1,098 in 1855 to 1,516 in 1861. The sum paid to the Lifeboat Institution in 1861 is £2,877 3s. 2d. The payments by the Board of Trade direct for rewards and gratuities and for services at wrecks amount to £1,292 1s. 6d. The expense of maintaining the mortar and rocket apparatus is £2,246 6s. 4d., being a total payment of £6,415 11s. for saving and endeavouring to save life during the year 1861.

ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

At the last ordinary monthly meeting of the executive committee of this Association, held on Tuesday, September 2nd, Mr. L. E. Fletcher, chief engineer, presented his monthly report, of which the following is an abstract:—

"During the past month the ordinary visits of inspection have been made, and 8 boilers tested by hydraulic pressure, the following defects being discovered in the boilers examined:—Fracture, 3 (2 dangerous); corrosion, 26, (6 dangerous); safety-valves out of order, 14; water gauges ditto, 10; pressure gauges ditto, 13; feed apparatus, ditto, 4; blow-off cocks ditto, 37 (1 dangerous); fusible plugs ditto, 6; furnaces out of shape, 3; blistered plates, 2. Total, 118 (9 dangerous). Boilers without glass water gauges, 4; without pressure gauges, 16; without blow-off cocks, 11; without back pressure valves, 31.

"The principal cases of dangerous injury which have arisen this month have been due to corrosion, the continued recurrence of which shows the importance of having all boilers examined, not 'externally' only, but also 'internally and thoroughly.'

"Another explosion has occurred during the last month to the class of plain cylindrical egg-ended boilers, fired externally. The boiler in question, which was under the inspection of this Association, was one of a series of six connected together, in the midst of which it had worked, being the fourth from one end, and the third from the other. Its length was 30 feet, its diameter 5 feet, the thickness of its plates $\frac{3}{16}$ ths of an inch, and its working pressure 50lb. The rent, as is usual in these cases, occurred at one of the transverse seams over the fire, but the development of the line fracture was somewhat peculiar. In ordinary cases these boilers, on explosion, separate at one of the ring seams into two distinct halves, which fly in opposite directions; but, in the present instance, the first belt of plates was completely severed from the remainder of the boiler and flattened out, having rent through the line of rivets at each of its four edges, while the egg-end had become entirely disengaged from it, and, in addition, was torn into two parts. The remainder of the boiler, which was by far the greater portion, being about twenty-four feet long, had flown to a distance of about eighty to ninety yards, and the chimney, which was reduced to a heap of ruins, had either been swept down by it in its course, or blown down by the impact of the steam.

"There was no evidence of there having been either deficiency of water or excess of pressure; while each boiler in the series was fitted with two lever safety-valves of three inches diameter, a glass water gauge, and a back-pressure feed valve. The exploded boiler was about four years old, and had been repaired seven months since, at the part immediately over the furnace, by the introduction of two new plates.

"It will be observed that the above explosion is another instance of the liability of these externally-fired boilers to rend at the transverse seams over the fire. The combined

duty thrown upon these seams is so great, that there is more uncertainty with these boilers than with those of the internally-fired double-furnace class in ordinary use in Lancashire. All the points in the latter can be so entirely mastered that they may be thoroughly relied on, and if well made, and in sound condition, can, with proper care in working, be guaranteed as safe for a period of twelve months from the time of examination. Not so, however, with the externally-fired boiler, in which the shell has to endure the entire disruptive strain combined with the direct impingement of the flame. In the internally-fired boiler these two duties are divided; the shell, which bears the tensile strain, being guarded from the intense action of the fire, which the furnace tubes are adapted to bear, from their small diameter and facility for strengthening, either by flanged seams, hoops, or otherwise; while the deposit, which to a great extent rolls off the furnace crowns, and falls harmlessly to the boiler in one case, deposits itself immediately over the fire in the other. Thus the seam of rivets in externally-fired boilers have to contend with the combined influence of tensile strain, the direct action of the fire, and too frequently with an accumulation of incrustation tending to overheating, and even where this does not form a positive coat, it may yet suffice so to thicken the water that the steam lifts it from the surface of the plate, when over-heating unavoidably ensues; added to which sudden drafts of cold air, on opening the furnace doors, cool the outer laps of the plate at the seams, which thus become subjected to the constant alternations of expansion and contraction.

"Under these circumstances it is not surprising that the seams of rivets in under-fired boilers should frequently be found suddenly to give way, for which the surest remedy will prove to be the substitution of internally-fired boilers in their place. Where, however, those externally-fired are still adopted, it is earnestly recommended, in the first place, that good materials and workmanship should be secured; in the second, that every means should be adopted for the prevention of incrustation; and, in the third, that the seams of rivets should be constantly and narrowly watched, so as to detect the first signs of weakness, which should be immediately repaired.

"Ready examination is facilitated by setting these boilers, as some of our members are doing, with a single direct flash flue, in which are a series of bridges, one behind the other, for keeping the flame in contact with the boiler; an entrance being made beneath the furnace bars, as well as a small archway through the back bridges, to allow of a communication throughout."

EXAMINATION PAPERS, 1862.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in May last:—

(Concluded from page 646.)

FREEHAND DRAWING.

THREE HOURS ALLOWED.

Make an outline, from memory, of any drawing that you have made during the last twelve months, either of furniture, ornament, foliage, or the human form.

Make an outline, half the size of life, of some portion of the engraving which is hung up. The candidate is at liberty to select what part of the print he will draw, and should take the portion which is most in accordance with the line of art he has studied.

Make an outline of the portrait the size of life.

Candidates are not required to do all three subjects.

DIRECTION FOR THE LOCAL BOARDS.

Hang up an engraving of Sir E. Landseer's Bolton

Abbey, or if this work cannot be obtained, some other good engraving should be placed before the candidates in free-hand drawing.

Place an oil portrait of a man's head, the size of life, where it can be distinctly seen by the candidates. If possible the portrait should be of some well-known person.

GEOMETRICAL DRAWING.

THREE HOURS ALLOWED.

The constructions must be accurate, and show clearly, by plain and dotted lines, with appropriate letters of reference, the principles on which they are based. The constructions may be put in ink, or left in pencil, at the discretion of the candidate, provided they are distinct.

No deviation from the conditions of the questions can be admitted; and since no candidate must answer more than two questions from any one section, he is advised not to attempt more than the time will admit of his completing, since little or no credit will be given for incomplete or inaccurate answers.

I.

1. Draw a line AO, 5·2 inches long, divide it into 13 equal segments in the points B, C, D, E.....O. From the points C, F, I, M, as centres, with radii of ·8, ·7, ·5, ·4 inches, describe concentric circles; strengthen (or put in ink) the parts of these circles, so as to form the pattern called in ornamentation a *guilloché*.

2. Draw 16 parallel lines ·1 inch apart, and a sufficient number of lines, at right angles to them, at the same distance apart; strengthen, or put in ink, or tint lightly, the appropriate lines, or spaces, so as to form a *fret*, or *Etruscan border*, between the two outside continuous bands.

3. Draw a circle of 3·5 inches radius, divide it into 32 equal parts for the points of a *compass card*, complete the figure, drawing the sides of the *points* tangents to a central circle of ·5 inches radius.

II.

1. Construct a mean proportional and a third proportional to two lines of 1, and 1·75 inches.

2. Divide a line 3·5 inches long into two parts which shall be to each other as 1·75 : 3·25.

3. Construct a square of 1·75 inches side and a rectangle equal to it in area, having its sides as 1·75 : 3·25.

4. Construct an equilateral triangle equal in area to a square of 2·5 inches side.

III.

1. Construct a polygon from the following conditions:—

Side AB = 2·5 inches. Angle ABC = 90°

" BC = 2 " " BCD = 110°

" CD = 1·75 " " CDE = 130°

" DE = 1·84 "

Write down the length of the remaining side EA, and the two angles DEA, EAB.

2. Construct a figure *similar* to this polygon, but of $\frac{3}{4}$ its area.

3. Construct a triangle equal to the same polygon, having its base in AB produced, and its vertex in the angle D.

4. Construct in the same manner a triangle equal to the polygon (2), and show that this triangle is $\frac{3}{4}$ of the former.

IV.

1. Two lines are in the proportion of 3 : 5; their *plans* are in the proportion of 1 : 2; at what angles are these lines inclined to the paper?

2. Two parallel lines AB, CD are 2 and 3 inches long, and are inclined to the paper at such an angle that their *plans*, *ab*, *cd*, are 1·3, 1·95 inches long; the points A and C are both 1·5 inches above the paper, and the line joining

them is .75 inches long and perpendicular to both. Draw these lines in *plan* and *elevation*.

3. Three planes pass through a point P, 3.5 inches above the paper; the planes are inclined to the paper at 37° , 45° , 58° , and their three *traces* (or the lines in which they cut the paper) form an equilateral triangle. Express these three planes and their common intersections.

V.

An oblique pyramid has for its base a square, ABCD, of 2 inches side; the face on AB is inclined at 50° , that of BC at 60° , that on CD at 70° ; draw the plan of the solid, and write down the inclination of the fourth face on DA, and the height above the paper of the vertex or apex of the solid.

2. A right, or regular pyramid, 4 inches high, has a regular pentagon of 1.3 inches side for its base; the solid is cut by a plane parallel to one face, and passing through the middle point of the axis. Determine the true form of the section.

3. Draw the plan of the lower frustum of the pyramid as lying on the section in the paper.

4. Draw the plan of a cube of 2.5 inches edge when three of its corners are raised 1, 1.75, 2.75 inches above the paper.

VI.

1. A cone 3 inches high, with a base 2 inches in diameter, lies on its side on the paper, show the solid by a *plan* and *elevation*.

2. The same cone is cut by a plane passing through the middle of its axis, and parallel to the paper or horizontal, determine the line of the section.

3. Supposing the whole cone were *developed* (that is unrolled and spread flat), draw on this figure the line of the section of the last question, as lying on the surface.

4. A sphere of 2 inches diameter rests on the paper—it is touched by three planes all inclined to the paper, at 50° , and all equally inclined to each other—determine the height of the pyramid formed by these planes.

VII.

(PERSPECTIVE PROJECTION.)

(The eye of the spectator is six inches from the plane of the picture.)

1. A square of .25 inches side is the projection of one on the other side of the picture, at what distance must it be from the spectator if the original square is 1.25 inches side?

2. Draw the projection of the same square when its plane is horizontal, and two inches below the spectator's eye.

(1.) When one side is parallel to the picture, and 1 inch from it:

(2.) When one side is inclined to the picture, at 35° , and one corner 1 inch from it.

3. Draw the projection of a cube of 1.25 inches edge in any position, at pleasure, provided *no edge nor face* is parallel to the plane of the picture.

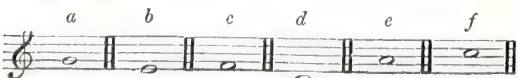
THEORY OF MUSIC.

THREE HOURS ALLOWED.

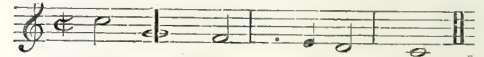
RUDIMENTS OF MUSICAL GRAMMAR.

(The answers to these questions must be given on music paper, and in the order in which they are put.)

1. Place a minor third above *a* (of the following), an imperfect fifth above *b*, a perfect fourth above *c*, a minor seventh above *d*, a diatonic semitone above *e*, and a chromatic semitone below *f*.



2. Write the following in a more modern form.



3. Put time signatures to each of the following.



4. Write the scale of Re (D) minor, in every form with which you are acquainted.

5. Write the following, at the same pitch, on the treble stave.



6. Transpose the following into Mi \flat (E \flat).



7. Place each of the clefs in every position it can occupy on the stave, and write over each the name of the voice for which it is so used.

8. Write, from memory, any melody with which you are acquainted.

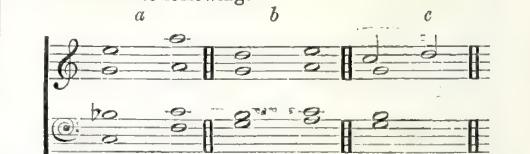
II. HARMONY, COUNTERPOINT, AND MUSICAL HISTORY.

(The answers to these questions (Nos. 5 and 6 excepted), must be given on music paper, and in the order in which they are put.)

1. Convert *a*, *b*, and *c*, severally, into discords of the dominant seventh, and resolve each of them.



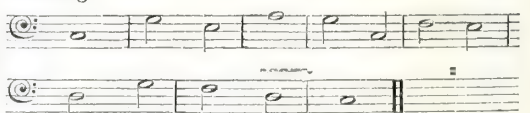
2. Correct the following.



3. Add three parts to the following.



4. Add a part, in any species of counterpoint, to the following.



5. State anything you know about the German musical composers of the last and present centuries.

6. Give the names of the principal English composers of the 16th and 17th centuries.

Proceedings of Institutions.

SALFORD WORKING MEN'S COLLEGE.—The report for last year says that continued development and successful progress have hitherto attended every department of the College. The average number of members during the past year has been 321 per term; the average increase over the three corresponding terms of the preceding year being 68 members. A great majority of the members of the College come strictly within the meaning of the term "working men," in its most restricted sense, and nearly all come within the term construed "liberally." This fact is the more especially important as it proves the fulfilment of the chief object and aim of the College. The return of the number of the members who joined the classes shows an average of 21 members for each subject taught, and an average attendance at each class of 13. The total number of members on the class-lists averaged 438 per term. Three examinations have been held during the year. The treasurer's abstract of the receipts and expenditure shows that the income of the College has amounted to £254 11s. 7d., and the expenditure to £193 5s. 10d., leaving a surplus of £63 5s. 9d. to the credit of the College on the revenue account, but on the building fund account there has been expended £78 19s. 10d., which leaves a balance against that account of £21 16s. 1d. The nett balance, therefore, in hand on the two accounts is £41 9s. 8d. The adult female classes are progressing satisfactorily. The boys' day school has been attended by an average of 123 pupils per week, and the girls' day school by an average of 90 pupils per week; they have both been efficiently conducted, and are spoken of in favourable terms by the Government Inspector in his report. The music class, for girls, is also in a satisfactory state. The boys' evening classes continue as usual. Analysing the trades of the 367 members of the last term, 82 of them only come within the designation of clerks, the rest, 295 in number, being composed of mill-hands, porters, mechanics, and various trades and handicraftsmen. The 20 class-lists, excluding the gymnastic class, contain 467 names of students, and the average attendance at the classes during the last term was 302 per week. Dividing the classes into four groups—the first group, comprising reading, writing, arithmetic, and grammar, has had 199 students, whose average attendance has been 104 per week. The second group—including algebra, mensuration, geometry, mechanical drawing, chemistry, and free-hand drawing and painting, has had 62 students, whose average attendance has been 50 per week. The third group—including English history, logic, Latin, and geology, has had 57 students, and the average attendance has been 45 per week. The fourth group—comprising French, German, elocution, phonography, and book-keeping, has had 133 students, and the average attendance has been 99. Referring to the first group, and keeping in view that adult students only are therein referred to, it is clearly obvious that notwithstanding the great progress made during the past twenty years in the education of youth, the large increase in the number of public day and Sunday schools, their superior efficiency, the moderate terms, and, notwithstanding, also, the universal acknowledgment by the working classes of the value and importance of education, a large number of the youth of this district either do not acquire the first rudiments of education at all, or the education imparted to them is so insufficient and imperfect as to necessitate a recommencement when in more mature years they join this College. Referring to the classes comprised within the second group, it is obvious that studies of an exact and practical character are those which first attract and most engage the attention of the working man. He can grasp their scope and aim. He looks for tangible results. He requires to know things as they really exist, their forms, their qualities, their powers.

Hence at this College we must expect to find the largest number of working men engaged in these studies. Many of them, no doubt, have in view the application of the practical sciences to their respective trades, and in this view the teachers may justly be proud of the result of their labours, inasmuch as they are enabling young men to raise their social standing and to increase their means. Indeed, to Institutions such as this, may undoubtedly be referred the revolution now taking place in most of the trades, by which skilled or scientific labour is rapidly being substituted for the more ordinary kinds. But a large number of the pupils devote themselves to these studies from the love of investigating that which is real and true, as a means of mental training, and as first steps towards a wider field of investigation and thought to which these sciences are the stepping-stones. In the third group are comprised the studies which it must be regretted do not attract so much the attention of the working man as their importance demands. Indeed, it is apparent that highly intellectual and refining studies cannot be expected to enlist the sympathies or obtain the devotion of more than a small proportion of the members of this College. With respect to the subjects included in group No. 4, they are provided in the College, to enable all who desire it to improve themselves in the way their own interests or special motives may dictate. It must be remembered that entire freedom of choice as to the nature of the studies to which they devote themselves, is allowed to the students, so that the class-lists of this College are an exact index of their requirements and tastes. A careful scrutiny of the names of the members on the class-lists, for two or more years, develops the fact that a very small proportion of the members enter the College to undergo a systematic course of instruction; indeed, it clearly indicates that generally each member enters it for a specific object of study, to supply some one or two wants, and that object accomplished, he is not again seen until some other requirement sends him back. The examinations which have taken place during the past year, under the auspices of the Society of Arts and the Council of Education, furnish the most satisfactory assurance as to the quality of the education given. The nature of this Institution, however, forbids us to expect that many of the pupils will avail themselves of the advantage these examinations are calculated to confer upon them. The very facts mentioned above indicate that however well up the student may be in the special subject of the examination, his entire devotion to that subject, to the exclusion of other necessary studies, will often occasion his rejection in the preliminary examination, and if he should be enabled to pass that examination, his want of proficiency and readiness in writing and English composition place him at a disadvantage in the final examination. With regard to the constitution of the College, it is of a character to ensure, by the widest possible system of representation, the existence of a popular executive in whom the entire management is vested. It has no restrictive rules. It allows the freest possible scope for development. It ensures its adaptation to the wants of the members. It is imperative only in this:—that the object of the College must be to enable working men to improve their education and to acquire knowledge. These terms, honestly construed, are sufficient to ensure and protect the College from being turned away from its legitimate path. To be of use to the working population, its fees must always be of the most moderate character, hence its existence as a Working Men's College will depend very much upon the generous sympathy of honorary teachers. But this sympathy can only exist with a state of internal harmony. The moment discordant elements are introduced into the College, that moment it will begin to decline. Internal peace means success, and the continuance of the privileges the College affords. Discord means the rapid decay and ruin of the Institution. Let this be well understood by the members; let every new proposition be carefully considered and critically examined before its subject be introduced into the College; let every de-

partment carefully abstain from those highly exciting and seductive popular subjects, the introduction of which has, from time to time, ruined many Institutions, and the career of this College will be a continued success. The following is a return of the trades of the members:—Mercantile clerks, 72; warehousemen, packers, &c., 62; printers, 19; decorative artists, 3; shopmen, 12; curriers, 2; shoemakers, 4; architects, 2; chemists, 3; various handicraftsmen, 46; teachers, 5; draughtsmen, labourers, millhands, and sundry miscellaneous occupations, 126. Total, 361. The ages of the members are as follows:—16 and under 20, 147; 20 and under 30, 185; 30 and under 40, 23; 40 and under 50, 6. Total, 361. The return of the number of classes attended by the several members shows that 187 attend one class each; 109 attend two classes each; 18 attend three classes each; 7 attend four classes each; 2 attend five classes each; 1 attends six classes.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, September 5th, 1862.]

Dated 31st May, 1862.

1647. I. Villa, 12, Denmark-street, Soho—A new and improved method of exhibiting terrestrial and astronomical phenomena, and of facilitating the solution of problems relating thereto, without the aid of calculation.

Dated 21st July, 1862.

2075. W. Clark, 53, Chancery-lane—An improved pomade or balsam. (A com.)

Dated 7th August, 1862.

2215. R. A. Brooman, 166, Fleet-street—Imp. in covering ships and vessels built of wood, or iron ships, with a backing of wood, before placing iron, steel, or other armour plates on such ships and vessels. (A com.)

Dated 9th August, 1862.

2236. G. T. Bousfield, Loughborough park, Brixton—Imp. in apparatus to be used in the manufacture of hat bodies. (A com.)

Dated 14th August, 1862.

2280. A. Walker, Liverpool—A new instrument to determine or ascertain the depth of water and the distance a ship has run.

Dated 16th August, 1862.

2306. R. Barclay, Paris, Canada West—Imp. in chronometers and other time-keepers.
2308. C. H. J. W. M. Liebmann, Huddersfield—Imp. in machinery for finishing textile fabrics.
2310. Colonel M. Iturriaga, Tavistock-street, Bedford-square—Imp. in fire-arms.

Dated 18th August, 1862.

2312. G. Chapman, Edinburgh—Imp. in reaping machines.
2314. J. Cimeg, Great James-street, Bedford-row—Imp. in depositing silver and other metals on fabrics and other materials.
2316. W. E. Newton, 66, Chancery-lane—Imp. in connecting plates, sheets, or slabs of metal or other materials, and fastening the same on to framing applicable to armour plating for ships, vessels, or batteries, and to roofing and other similar purposes. (A com.)

Dated 19th August, 1862.

2320. T. Wilkinson, Rathmines, Dublin—Imp. in machinery or apparatus for singeing pigs.
5322. General H. Dembinski, 13, Rue de l'Oratoire, Paris—A motive apparatus and processes proper for giving to it a continuous motion and unlimited strength.
2324. W. J. Hoyle and J. Proven, Halifax—Imp. in mechanism and arrangements for supplying lubricating matter to the cylinders of steam engines, and to the bearings and other surfaces of mechanism.

Dated 26th August, 1862.

2326. J. G. Tongue, 34, Southampton-buildings, Chancery-lane—Imp. in processes and apparatus for extracting the natural wax or fatty matters from wool, hair, or other animal or vegetable substances containing the same, and in the application thereof to various useful purposes. (A com.)
2328. C. Callebaut, 4, South-street, Finsbury—Imp. in sewing machines.
2330. W. H. Hutchinson, Newton Heath, near Manchester—Imp. in the manufacture of ammonia and the prussiates of potash or soda, and in apparatus employed in such manufacture.
2331. J. Standish and J. Gooden, Egerton, near Bolton—Imp. in machinery or apparatus used in the preparation of cotton, wool, flax, and other fibrous materials to be spun.
2332. S. Wilkes, Wimpole-street—An improved attachment for door knobs.
2333. C. Chinnock, Queen's-road-west, Regent's-park—An improved construction of cork screw.

Dated 21st August, 1862.

2334. S. J. Paris, Manchester, and W. Bate, Salford—Imp. in alphabetical electric telegraphs.
2335. J. C. Schemmann, Hamburg—Imp. in the manufacture of steel.
2337. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in governors for steam engines. (A com.)
2338. T. Clements, P. Llewellyn, J. Llewellyn, and J. W. James, Bristol—Imp. in the construction of a self-acting lubricator for lubricating various parts of steam-engines.
2340. A. Boubee, Paris—An improved veil protector.

Dated 22nd August, 1862.

2341. S. F. Griffin, New Adelphi-chambers—Imp. in apparatus to be used in the distillation of petroleum or any oleaginous, resinous, or alcoholic bodies.
2344. W. Barrett, Norton Furnaces, near Stockton-on-Tees—Imp. in casting railway sleepers and chairs where tie-bars are used.
2346. J. Mackay, Glasgow—Imp. in the manufacture of soap powder.
2347. R. Harrington, Northampton-street, Birmingham—Imp. in umbrellas and parasols, and in the manufacture of parts thereof.
2349. D. Moore, Brooklyn, New York—Imp. in breech-loading fire-arms.
2350. G. Bottomley, Leeds—Improved apparatus for expressing moisture from pulpy or solid substances.
2351. D. Moore, Brooklyn, New York—Imp. in revolving fire-arms.
2352. W. Carwood, Stepney, W. Boaz, Bromley, and C. Colwell, Belvedere-place, Southwark—Imp. in apparatus for propelling ships and other vessels.
2353. T. Wood, Manchester—Imp. in the slide valves of steam-engines.

Dated 23rd August, 1862.

2357. M. K. Angelo, Gloucester-place, Portman-square—Imp. in apparatus used in the manufacture of shellac.
2358. M. Henry, 84, Fleet-street—Imp. in stuffing boxes and their packings. (A com.)
2359. C. H. Roeckner, Marsh-street, Bristol—Imp. in syphons for discharging or drawing off large bodies of water, and in the mode of charging, fixing, and constructing the same, whereby they are rendered permanently self-acting.
2360. W. E. Newton, 66, Chancery-lane—Imp. in the mode of and apparatus for treating fermentable substances for brewing and distilling. (A com.)

Dated 25th August, 1862.

2368. J. Rider, Basinghall-street, Leeds—Imp. in the construction of fencing posts or standards, to be used either for straining or otherwise sustaining fences, the said improvements being also applicable to all kinds of gate posts, telegraph poles, signal posts, or other upright standards or pillars.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2386. M. A. F. Mennons, 24, Rue du Mont Thabor, Paris—Imp. in smoke-consuming furnaces. (A com.)—28th August, 1862.
2387. M. A. F. Mennons, 24, Rue du Mont Thabor, Paris—An improved assorting apparatus applicable to the numbering of raw silks. (A com.)—28th August, 1862.

PATENTS SEALED.

[From Gazette, September 5th, 1862.]

September 5th.

- | | |
|---|---------------------------------------|
| 604. J. Barker. | 670. J. Johnson and S. Morris. |
| 607. J. G. Shipley. | 671. W. Conyers. |
| 612. J. Fowler, jun., D. Greig, and R. Noddings. | 674. A. M. A'Beckett. |
| 613. T. Ball, W. Ball, and J. Wilkins. | 701. A. Quinard. |
| 616. R. Restell. | 710. W. Turner. |
| 617. T. H. Wood. | 717. W. McAdam. |
| 619. A. W. Williamson. | 718. J. Hunter and R. Scott. |
| 621. G. Edmonson. | 721. S. N. De la Haye de Barbezieres. |
| 622. A. Blair. | 731. L. P. Mongruel. |
| 623. W. Paterson, W. A. Sanderson, and R. Sanderson, jun. | 746. M. A. F. Mennons. |
| 626. J. Deane, jun. | 771. J. Cumming. |
| 628. P. J. Guyet. | 797. E. Lord. |
| 631. W. Palmer. | 807. M. Henry. |
| 640. R. A. Brooman. | 815. E. Morewood and A. Whytock. |
| 641. W. Parker and G. H. Batman. | 825. F. Morewood and A. Whytock. |
| 642. W. Spence. | 836. R. Boby. |
| 646. A. Barclay. | 842. A. V. Newton. |
| 648. J. T. Calow. | 913. H. Smith. |
| 652. J. Nadal. | 1108. W. E. Newton. |
| 656. O. and J. Kerautret. | 1162. C. Callebaut. |
| 657. E. G. Camp. | 1261. W. E. Newton. |
| 658. C. Hall. | 1282. A. H. Fielden. |
| 659. T. B. Wilson & W. Wilson. | 1419. J. B. Pope. |
| 662. G. Davies. | 1812. J. B. Wood. |
| | 1845. G. Haseltine. |
| | 1884. E. Hunt and H. D. Pochin. |
| | 2030. A. V. Newton. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, September 5th, 1862.]

1966. B. Baugh.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 19, 1862.

INTERNATIONAL EXHIBITION OF 1862.**CLOSE OF THE EXHIBITION.**

Her Majesty's Commissioners have passed the following resolution :—

Resolved—"To close the Exhibition on Saturday, the 1st of November, but that the building shall remain open for another fortnight after that date, at higher prices of admission, in order to afford the Exhibitors in the Industrial Department an opportunity of selling their goods."

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound

in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s. ; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

It was the intention of the Council to issue the volume complete in the early part of the present month, but as several of the Reports have not yet been received by Her Majesty's Commissioners, the completion of the entire work has been unexpectedly delayed; the Council, however, unwilling to defer the publication of the Reports already completed, have determined to issue to the subscribers those that have been received up to the present time. When all the Reports are delivered, the parts now about to be issued to subscribers will be exchanged, if uninjured, for the perfect volume, bound or unbound, as desired.

NOTICES TO INSTITUTIONS.

Those Secretaries of Institutions who have not already forwarded to the Secretary of the Society of Arts copies of their last Annual Reports, are particularly requested to do so.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October.

INTERNATIONAL EXHIBITION OF 1862.—VISITS OF SCHOOLS.

The following is a continuation of the Schools reported to Her Majesty's Commissioners as having entered the Building, from 8th to 11th September, 1862 :—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Sept. 8	Hatfield	National	Hon. and Rev. W. C. Talbot.	14	14
" 9	Sharnbrook (Beds) ...	National	H. H. Magniac, Esq. ...	46	
" "	St. George's (Hano-ver-square ... }	Workhouse	Committee	61	
" "	Marchwood (Hants) ..	Marchwood	H. F. K. Holloway, Esq. ...	13	
" "	Clifford, Frome	National	Rev. W. B. Tritton	43	
" "	Hounslow	Holly House	Mr. Samuel Mortimer ...	30	
" "	Woolwich	St. Thomas's	Messrs. Craig and Sargent.	16	
" "	Aylesbury (Bucks) ...	St. Margaret's	Teachers	32	
" "	St. John's - grove, } Richmond ... }	Private	A. E. Gardner	9	
" "	Putney	Martyn's	The Trustees	21	
" "	East London	Shoe Black	Mr. Wise	18	324
" "	Winchester	Trafalgar House	Mr. Nash	35	
" 10	Bermondsey	Bacon's Endowed	The Trustees	80	
" "	Farringdon-street ...	British	Subscription	12	
" "	West Smithfield	St. Bartholomew's	Rev. I. Abbiss	8	
" "	Thatcham (Berks) ...	Lady Winchcomb's Charity ...	The Trustees	12	
" "	Wantage (Berks)	Grammar	Rev. C. H. Crooke	19	
" "	Kensington	Newton House	Mr. E. Williams	60	
" "	King's Sutton (Notts).	Choir	Subscription	18	
" "	London	Rag Collecting Brigade	Mr. Lloyd	21	

RETURN OF SCHOOLS (*Continued*).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
" "	Margaret-street, Cavendish-square }	All Saints'	Rev. W. Richards	30	433
" "	Tottenham	National	Subscription	50	
" "	Camberwell	Green Coat	Do.	65	
" "	Bethnal-green	St. Matthew's	Do.	58	
" 11	Langley Marsh (Bucks)	Winter Evening	Subscription	24	433
" "	Blackheath	All Saints'	Rev. J. S. Clarke	14	
" "	Mile-end	Bancroft's	Draper's Company	92	
" "	Ealing	National	{ Baroness Rothschild and friends }	135	
" "	Egham	St. Giles' Choir	Rev. — Vincent	13	
" "	Kennington	Oval	By Parents	26	
" "	Boxgrove, Sussex	Box-grove	Rev. W. Barnett	23	
" "	Wiltshire	Carsham	Lord Methuen	40	
" "	Streatham, Surrey	National	Subscription	90	
" "	East London	Shoe Black	Mr. Wise	18	
" "	Bedminster (Bristol)	National and Choir	R. Phippen, Esq.	26	
" "	Ruislip	National	Committee	59	
" "	Notting-hill	Franciscan	T. Chandless, Esq.	10	
" "	Do.	" Miss Horley's"	Miss Horley	14	
" "	Hackney	Unitarian	Subscription	10	
" "	Bayswater	Female Orphan Asylum	Mrs. H. Cullingford	10	
" "	Druham (Uxbridge)	Endowed	Mr. and Mrs. Meson	35	
" "	St. George's-in-the-East }	St. Stephen's Home	Lady Superior	13	
" "	Leigh, Essex	National	Rev. W. King	35	
" "	New Cross, Deptford.. }	{ Warehousemen and Clerks' Orphan Asylum }	Messrs. Oppenheim & Sons.	71	
					758

VISITS OF WORKMEN.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building from 6th to 11th September, 1862*—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
Sept. 6	Brewers	Spitalfields	Messrs. Truman and Co.	390
" 8	Inmates of the Licensed Victuallers' Asylum	Old Kent-road	Committee	109
" "	Workmen	Stonehouse, Gloucester	Mr. C. Hooper	600
" "	42nd Company R. Volunteers	Lancashire	Subscription	63
" "	21st Company R. Volunteers	Hampshire	Do.	50
" "	Iron Founders	Lambeth	Messrs. Smith and McGaw	250
" "	Artisans	Paris	Prince Jerome Buonaparte	40
" 9	Aged Inmates of Workhouse	St. George's, Hanover-sq.	Committee	58
" "	Villagers	Wotton, Surrey	W. Nicholson, Esq.	62
" "	42nd Company R. Volunteers	Lancashire	Officers	70
" "	Canvas Weavers	Doncaster	C. J. Fox, Esq.	30
" "	Mouse-trap Makers	Selsey, Sussex	Mr. D. Pullinger	28
" 10	Needlewomen	Colchester	F. W. Hurst	26
" "	Brewers	Hoddesden	Messrs. Christie and Co.	16
" "	Glass Makers	Birmingham	Messrs. Chance and Co.	650*
" "	Brewers	Brentwood	Messrs. Fielden and Co.	53
" "	Cotton Spinners	Staley Bridge (Lancashire)	Subscription	17
" "	Military Pensioners	R. H. Chelsea	The Commissioners	52
" "	Men of the P. and O. Steam Packet Company	Southampton	A. Anderson, Esq.	181
" "	Corn Merchants' Assistants	King-street, Borough	Mr. Russell	18
" 11	Biscuit Bakers, Men and Families	Reading (Berks)	Messrs. Huntley and Palmers	1,060
" "	Inmates of Bancroft Almshouses	Mile-end	Drapers' Company	50
" "	Undertakers	Euston-road	Antill and Co.	17
Total				3,890

* These, together with 650 in last week's return, and 65 who came on the 6th of August, and not included in any return, make a total of 1,645 sent by Messrs. Chance and Co.

CHEMICAL SUBSTANCES AND PRODUCTS OF INDIA.

The following information on this subject is extracted from the Descriptive Catalogue of the contributions from India to the International Exhibition:—

Two descriptions of salt are produced at Cuttack; the first, called *Pungah* salt, is obtained by boiling to a residuum highly concentrated brine; the second is the *Kurkutch*, or gravel salt. As the word signifies, it is produced by the aid of solar evaporation only, from sea-water. The water is introduced into small beds prepared with a smooth bottom of clay, slightly depressed in the ground, and surrounded by a slight ridge of earth. A few hours' exposure in the burning sun of March and the two following months, is sufficient to evaporate the water in these beds, which deposits the salt it held in solution. A fresh supply is then let in, and the process of total or only partial evaporation is continued, till the bottom of the beds is covered with a layer of this salt, more or less thick, which is then scraped up.

Both these kinds of salt are produced all along the seaboard of the province from February to June, and under what is practically a Government monopoly. The last season's manufacture amounted to 50,000 tons of the one and 44,000 tons of the other. The production is considered handsomely to remunerate the petty contractors who engage with Government for its supply, at 10 annas and 4 annas per maund for each kind respectively, which is equivalent to 35s. 5d. per ton for the one, and 14s. 5d. per ton for the other, in English money and measure. To the *Pungah* must be added about 50 per cent., to the *Kurkutch* about 25 per cent., for expenses of superintendence, &c. To the more extended manufacture of the white salt, the present insalubrity of the manufacturing localities and the consequent difficulty of procuring labour, as well as the insufficiency of the fuel supply, are obstacles. The coarser kind may be manufactured *ad infinitum*, but it is no where appreciated so much as locally, that is, in the district, as, not being "cooked" like the *Pungah*, it is more acceptable to the scrupulous caste prejudices of the Oryahs. The bulk of both kinds is exported to Calcutta. The local retail price at Cuttack in the shops of the bazaar for *Kurkutch* is 6s. 3d. per maund of 100 English lbs.; *Pungah* is sold at the Government depôts at 8s. 3d. per maund.

The Local Committee of Cuttack, in specifying the local prices of articles, do so with this explanation, that it is impossible to give any rates which are average ones, or which are in any degree equally applicable all over the district. Where any particular article is produced, there it is cheapest, and the cost and difficulty of transport and the want of competition are such, that a distance of 50 miles between the place of production and the central market, makes a difference in price of 50 or 100 per cent. in the rates at which some articles are bought and then sold. This is especially the case with the oil seeds of the province, cotton, &c. Under these circumstances it would have been impossible for the Committee to have stated any average rates. The prices which have been generally mentioned in the catalogue are the local, that is, the Cuttack bazaar retail prices. It may be as well to state that all articles coming from Sumbulpore or elsewhere, by river carriage, are cheapest in the months of July and August, when the rivers first admit of navigation, and that between July and January the rates for the same articles may vary as much as 50 per cent.

There are five salt mines in the Shahpore district worked by Government in the salt range; one at Kalabagh, across the Indus, and several in the Kohat district, and the supply from these sources may be said to be inexhaustible. An excise duty of rupees 3 per maund of 80 lbs. is now charged upon all salt sold, the rate having been lately increased (two years ago it was but 2 rupees); and the revenue derived from this source amounted to upwards of £280,000. The salt mines are the means of

supplying the traders of the Punjab with a kind of paper currency. By payment of the regulated price at any of the Punjab treasuries, a warrant for the delivery of so much salt at the mines may be obtained; these documents are transferable, and pass from hand to hand like bank notes.

Nitre saltpetre, locally "*Khai jabkahi*," is produced in Cuttack. Some is manufactured by a process of solution and filtration, which it would be unnecessary here to describe, from a thin whitish efflorescence scraped off old mud walls and buildings, &c., where it is produced more or less in all localities freely, and continually exposed to the action of sea air in the cold season, and dependent on the existence of certain conditions. Some is more carefully prepared, for the most part only in the hill tracts, from a similar efflorescence found in the cold months on the base of cow-house walls, and there generated, it is to be supposed, by the action of the ammonia thrown off from the urine of the cattle. Neither kind is manufactured extensively enough for commercial purposes, still the local manufacture furnishes a good deal of the petre, if not the bulk of it, used in native gunpowder for shooting and fire-works.

Sal-ammoniac for tinning and frigorific mixture, 12 annas per seer, is made in various parts of Oude. It is manufactured from the contents of cesspools, and is used for tinning copper pots and pans; mixed with common salts, nitre, &c., it forms a frigorific mixture.

Nitrate of potash for frigorific mixtures and for gunpowder, three seers per rupee, is made in various parts of Oude. This is nitre of the first crystallization; nitre is found in the earth of old buildings and ruins, which has long been exposed to the air; water is filtered through this earth, and then boiled and concentrated. This kind is only used for frigorific mixtures.

Saltpetre and salt are produced abundantly in some parts of Shahabad, but crude saltpetre is prepared at from six to seven rupees per local maund by the Nooneahs; this in its crude state would be £15 to £18 per ton, while the salt produced with the saltpetre is of a coarse kind, and only sold to the poorest of the community, under the names of "*Kharree Nimuck*." It can, however, easily be purified by boiling, and then is a good and pure salt.

It may be here noticed, as an important and singular fact, that the strata on the north, east, and south faces, (where the face of the plateau towards the plains is invariably precipitous) has a considerable dip inwards, varying from 5 to 45 degrees. This circumstance prevents any springs making their appearance on the face, which would have the effect of leaving the table lands dry, and would render them a desert. This fortunate dip has a contrary effect, retaining the moisture as in a basin, and water in consequence may be had in most places on the table lands at a moderate depth, while in several localities springs of pure and limpid water flow above the surface all round the year, consequently numbers of villages shed the table lands, and it is probable that not many years more will elapse before large tracts are brought into a more profitable cultivation of coffee, cotton, and oil seeds, by European energy and skill. The finest rice produced in the district is already grown in their shallow valleys, and, when the soil has been subjected to the plough, proves by its abundant crops what it might produce under a proper cultivation.

Vitriol was once largely manufactured on the banks of the Soane, in Shahabad, from sulphate of iron, the product of the Kymore range; but the death of the gentlemen who instituted the manufacture stayed it. It is now only a native manufacture on a small scale.

Soap is made from cow's suet and a peculiar efflorescence gathered from barren land, called by natives Oosur. The efflorescence is called Rêh. It is used for washing; eight seers per rupee.

Tinder from the sago palm is found under the leaf of a sago palm tree, and ignites very easily.

Bat's dung is mixed with water and ashes, and strained

and left to dry, when ammonia effloresces, and is used as an ingredient for gunpowder. It is also used for manure (guano).

An article called Sajjee is used in soap manufacture. Sajjee is made in considerable quantities in the districts of Mooltan, Jung, Jhelum, and Thanessur. It sells for about 32 lbs. per shilling.

OIL SEEDS.

The *Ricinus Communis*, known by the provincial name of Bheeree, has two or three marked varieties; it is largely cultivated in Shahabad, principally for home use, though a considerable quantity finds its way into the castor-oil factories of Dinapore. The native process only succeeds in making a very impure oil, which is so offensive for its smoking qualities in burning, that it is not sought after by them for that purpose, but only for anointing leathern well ropes, shoes, &c., and, being a cheap oil, is largely used for the latter purpose. It is thick and viscid, and, extracted under the native process, soon turns rancid, while by the European process, it is next to the cocoanut oil, one of the purest and best burning oils known. The plant requires scarcely any cultivation, and in South Shahabad is oftener sown on the borders of a valuable field as a hedge than for any other purposes. It loves, however, a sandy loam, and will not grow in the clays. Its yield under the native process is about 33 per cent. of the impure oil above described, but a larger quantity, and a purer oil, is extracted by the European process. Newly cleared jungle lands grow the castor plant abundantly, and its extended cultivation is only bounded by the demands in the market, so long as the rates are remunerative; for although the sowing and tendence of the plant costs little trouble, yet the picking of the seed is a troublesome process, and it requires a much larger amount of room to come to perfection. The natives sow and proot the plant yearly. It is not known why this should be, as it grows and yields abundantly, the second and third years, in hedges, or other open places. When cultivated by itself, the natives always sow the seed too close, and consequently the plant is comparatively small; for attaining its full perfection no place is better for it than a hedge or a bank.

The *Ricinus Communis* is cultivated in Lucknow as a mixed crop. It is sown in June by almost all the villagers, not extensively, but principally for their own use. Its cultivation can be extended all over Oude. This oil is extracted by bruising the seed and then boiling it in water. The oil is afterwards skimmed off. This is the only seed out of which the oil is extracted by boiling, as in this case it is found cheaper than the method used for other seeds, which is by pressure. The cost of the seed is one rupee per maund, and the price of the oil is from two to five seers per rupee, according to the abundance of the crop in the season. The proportion of the oil yielded is about half the weight of the seeds boiled; used only for burning.

The plant is grown all over the province of Cuttack, a good deal in patches of newly cleared land in the jungles of the Tributary States and Sumbulpore. The oil is extracted in two ways. It is used for burning and culinary purposes, and medicinally also. The local market is now 11½ petuls of the seeds per rupee. Both the native methods of extracting oil are wasteful and tedious, and therefore expensive. European oil presses and a knowledge of some methods of clarifying the expressed oil, seem only to be required to render the oil seed crops of this extensive division of great value.

The flax *Linum Usitatissimum* is a well-known plant almost all over the world, but is in most parts of civilized Europe more cultivated for its flax than for its seed. In Russia and in India the contrary is the case, and it may fairly be said that in India its flax-producing qualities are unknown. It is therefore cultivated as an oil-seed alone. It is, however, probable that the stunted plants grown in India would be of little use as a flax bearer, until improved cultivation had again raised its standard of height. In

the Punjab and in Scinde considerable attention has of late been paid to this subject, and it would be an additional staple added to the agricultural resources of Shahabad and Behar, could it be brought under cultivation as a flax bearer here, which it doubtless could be with the same advantage as in the Punjab. It is always grown in Shahabad as an auxiliary crop with wheat, masoor, barley, and the spring crops; its bright blue flowers are a pleasing relief to the yellowish brown of the other cereals. I have never known it cultivated alone, so that I have no data as to its probable yield per beegah or acre. It would probably not be found to differ much from the linseed crops of England in that respect, were the cultivation equal: that is to say, were the same labour bestowed upon its cultivation, which, however, is not the case in this district at least. Its favourite soil appears to be the black clay (*kurile*), but it is sown largely in other soils, and the only difficulty to its indefinite extension appears to be want of facilities for carrying the crop to market. It is therefore grown in south Shahabad, principally for home consumption, and is used largely for lamps under the name of *Tessee-ka-Tel*. Under the native process it produces 25 per cent. of oil: what it would produce with the European method I am unable to say. The native method produces a tolerably clear-looking oil, but it smokes much in burning, showing that a large proportion of vegetable fibre finds its way through the rude press into the pure oil. Considerable quantities are grown near the Ganges for export. The price varies much according to the season and the quantity in the market. I have known it to sell for Rs. 40, or £4 sterling per ton, and I have known it fetch double that price. Until roads, railroads, and canals, with better modes of conveyance than exist at present, equalize prices, no average of price can be given with any certainty, as one season in one part of the country may have been favourable, and in another part unfavourable, all within a radius of twenty miles, and the two places show a difference of 50 per cent. in the selling price as well as in production: thus proving how imperfect are the means of transport from one part of the country to another, which would otherwise equalize the produce in the dearest market till a medium was found, or in other words, till further export to that place was unprofitable.

It is grown all over Oude, and only cultivated for the sake of the oil of its seed. Some fishermen make their nets from the fibre. This is cultivated as a mixed crop, principally with grain all over Oude. It is sown in the month of October, and never irrigated. It is never sown thickly, as the object is to get a large amount of seed for oil, and not fibre. It can be cultivated extensively, and there is no doubt that, with proper treatment, profitably for its fibre. The oil is extracted by pressing. The seed sells for 18½ seers per rupee, and the oil for five seers per rupee. Every five seers of seed yield 1½ seers of oil by the native process of pressing; used for cooking and burning.

Mustard (*Sinapis Ramosa*) is cultivated for its oil; one maund of mustard produces 13 seers of oil; cost rupees 5-3. Cost of conveyance to Calcutta, in dry season, rupees 10 per 100 maunds.

The *Sinapis Juncea* and *Ramosa* are not sown together, but each is cultivated as a mixed crop, with either grain, barley, wheat, or peas. In this way it is cultivated all over Oude. The oil is extracted in the usual way. The cost of the seed is 15½ seers per rupee, and that of the oil varies from three to eight seers per rupee. The proportion of oil extracted is 1½ seers from every five seers of seed; it is used for cooking and burning.

The *Sinapis Ramosa* and *Sinapis Dichotoma* are grown generally mixed with the rape seed, also called sarson, although the plant is a distinctly differing one, and the seed is a whitish-yellow: while the seed of the rape (*Sinapis Dichotoma*) is a dark-brown. They are rarely grown separately, though such is the case in many parts of the country, and ought to be the case here. It is grown extensively all over the district principally for local consumption, and, being sown in the month of October, is

generally sown as an auxiliary with grain crops, amongst which its white and bright yellow flowers are easily distinguished. Being always sown as an auxiliary, it is impossible to ascertain what would be its yield per acre if sown separately. It loves the loam, and does not take kindly to any of the clays. It is ready before the close of February for cutting, and is always cut slightly green, or the seed pods would burst and scatter the seed. Being cut, the plant is dried on the threshing-floor by the heat of the sun, which does its work in three or four days, when the seed is easily threshed out. Cattle eat the broken stalks, but it is questionable how far it was a very nourishing food for them. It is sold in the bazaar at from 16 to 20 seers per rupee, and yields, under the native method of crushing, 30 per cent. of a tolerably pure oil, while the residue, or cake, is used as a food for cattle. It would yield more and a purer oil, under the action of the oil-pressing and purifying processes of Europe; and probably 35 to 40 per cent. of its gross weight. It is largely used by the native community with their food instead of ghee, under the name of *metah*, or sweet oil; although for all other purposes it passes under the name of *kurwah*, or bitter oil. Most natives prefer it for the preparation of their curries and other warm dishes. The native oilmen give one seer or 25 per cent. of the expressed oil for every four seers of seed sent them, they keeping the balance and the cake as the price of labour; so that, with the seed at 16 seers per rupee, the value of the oil would be four seers per rupee.

Of the *Sesamum Orientale* (Teel) a most useful plant, there are in the district of Shahabad two kinds, and both are extensively sown in various parts. The first is sown in July, and is ready for reaping in Kartick or Aghun, say in November: the second is sown in August, but they are both ready nearly at the same time. These plants are also sown as auxiliaries, but with the highland rain crops, such as Ruhur, Motha, &c. The seed has about the same value as *Surson* in the bazaars, but the oil being tinner and purer, and almost tasteless, while burning with little smoke, is extensively used in Indian perfumery. It is extracted from the seed in the same manner as other oils. The residue or cake is eaten by the poorer classes as an article of food, and is greedily devoured by cattle. It grows on sandy loams.

There are two varieties of the *Sesamum indicum*. The one white seeded called "Teelnee," the other black seeded, called "Kala Teel." The two kinds are never sown together, but each is cultivated as a mixed crop with either *Eleusine Coracana*, "Merwah," *Paspalum scrobiculatum*, "Kodo," *Cajanus indicus*, "Arhar," or with cotton in the month of June. These plants grow all over Oude without the slightest difficulty, and without any care being taken of them. They are often met with growing luxuriantly by the road side. The oil is extracted by pressing. The cost of the seed of the white variety is 11 seers per rupee, and of the black 12 seers per rupee. The oil of the former fetches from 2½ to 4 seers per rupee, and of the latter 3 to 8 seers per rupee. Every 5 seers of each kind yield 1½ seers of oil. These seeds are also eaten by the natives made into sweetmeats; used for cooking and burning.

One maund of Teel (*Sesamum Orientale*) seeds produces 13 seers of oil. Cost, rupees 4-12. Cost of conveyance to Calcutta, in dry season, rupees 10 per 100 maund.

It is cultivated all over Oude for the sake of the oil contained in it. It is used for cooking and burning, and the seed boiled in sugar makes a sort of sweetmeat. It is often grown as a mixed crop: 13 seers per rupee.

The *Sesamum* black (Kala Teel) contains more oil than the white kind, and is eaten with *goor*: 11 seers per rupee.

The white and black sesamum are ordinarily used in the manufacture of oil in Rangoon.

In Moulmein it is used as oil for household purposes; one basket will yield about 25 viss of oil.

Price at Lahore about 9 lbs. per shilling. Both teel

and linseed are mentioned by Strabo as staple products of this part of India. Of late years the cultivation of these seeds and oilseeds generally has greatly increased, especially in the Mooltan and Ferozepore districts, and considerable quantities have lately been exported to France.

The Brassica *Erucastrum* (Terra "Gomvah" or "Semvah") is cultivated in Lucknow in the same way as the above, the cost of the oil is from 3 to 10 seers per rupee. It is used for burning.

All oils in Oude are extracted by the native press called "Kolhoo," turned by means of bullocks, with the exception of the castor oil seed, the oil from which is extracted by boiling in water, and afterwards skimming.

The *Carthamus Tinctoria* (Kussoom) found in Lucknow and is sown in October either alone, or along the edge of wheat crops; both light and heavy soils are adapted to it. It is cultivated in every village, but not extensively. There would be no difficulty in further cultivating it to any extent. The oil is extracted by pressing. The cost of the seed, which is called "Barre," is 18½ seers per rupee, and the cost of the oil is from three to four seers per rupee. This plant is also useful for the bright scarlet dye that its flower yields; used only for burning.

The *Bassia Latifolia* (Mohwah) a middle-sized tree, grows wild in the Taree, and is also planted in groves in most parts of Oude, near villages, &c. Its cultivation can be extended all over Oude, and it thrives without any trouble. Its flowers have a thickened and enlarged tube, in which is contained a considerable amount of sugar. They are dried and eaten by the natives, and also fermented for the manufacture of *Mohwah Spirits*. The cost of the oil extracted is rupees 3 per maund. The proportion of oil yielded by native process is about half the weight of the seed; used only for burning.

The poppy plant, *Poshtah-ka-danna*, the *Papaver somniferum*, is largely cultivated in all parts of Shahabad and Behar, as also in the neighbouring districts, for the drug (which is a Government monopoly, the well known opium of commerce). The seed has no intoxicating qualities, but has a sweet taste, and is used, parched, by the lower class of natives as a food; it is also much used by the sweetmeat-makers as an addition in their wares. This and the seed of the teel "*Sesamum Orientale*" are the only oilseeds, with the exception of the coconut, which are used for that purpose. It produces, under the native method, a clear limpid oil, which, however, has the disadvantage of burning very quickly. About 30 per cent. of oil is extracted, and the cake is then sold as a food to the poorer classes. The oil at present sells at about 5 seers per rupee. It appears that this oil, if properly prepared, would, from its thin and limpid character, be admirably adapted to supersede many of the purposes, if not all, where the more expensive olive oils of southern France and Italy are now used, and would be an admirable watchmaker's oil. This is thrown out as a suggestion for some practical men to decide. The production of this seed is only limited by the production of the poppy.

In Lucknow each ryot sows from 2 to 4 beegahs in the month of October. It is capable of being cultivated all over Oude. The oil is extracted by the common native press. The cost of the seed is 10 seers for the rupee, and the oil sells for 3 seers for the rupee; two-fifths of the weight of the seed employed is about the proportion of oil yielded by the native process. The poppy seed is eaten by the natives made into sweetmeats, provided the opium has been extracted from the seed vessel, otherwise it is bitter and narcotic, and under these circumstances the oil extracted is also bitter. It is used for cooking and burning.

These seeds are grown to a very considerable extent all over this province, and are, at least the sesamum is, beginning to be an important item in its exports, principally to Marseilles, where it is used for the manufacture of Lucca oil. Large quantities are brought down from *Sumbulpore*; and *Ungool*, *Dhenkanal*, *Hindole*, and *Tulchar* also supply a good deal of these seed oils. In the above-named states the cultivation of these crops can be extended

to an indefinite degree, as the principal oil seeds there grown, the sesamum and castor, are sown broadcast over slightly tilled land, from which the jungle has been superficially cleared, or on rocky ground unfitted for the cultivation of any other crop. The oil of these seeds is expressed in the common native *Ghana* or oil mill. For private domestic use the farmer generally extracts the oil from the above as from other oil seeds, by making a mash of the seed and boiling that, by which process he obtains more oil of a better quality than from the oil-man, though the cold-pressed oil is purer or clearer. Mustard seed oil is used generally for culinary purposes, and with the other oils for burning. The linseed plant, though grown extensively in the Sumbulpore district, and more or less all over the province, is nowhere cultivated for the flax it yields. All these oils are mixed together and sold under the name of mols, or thick oil. The local price of this common oil is, at the time of writing, 17s. 6d. per cuttack maund, 28 of which go to the ton weight. A good deal of this oil is exported to Calcutta, where the ruling prices are more than double the local. The most valuable of these oilseeds, namely, the sesamum, is of two kinds, named respectfully *Maghee* and *Bhadoo*, after the months in which they are plucked. The latter is the plumper seed, and yields the more oil. The season and prospects of the crop so govern the rates for these seeds that no average prices can be safely given.

SOUTH STAFFORDSHIRE EDUCATIONAL ASSOCIATION.

The members and friends of this Association held a Conference on Tuesday, September 9th, at the School of Art, Dudley. Lord Lyttelton presided, and the principal clergy and educationists of the district were present, and took part in the proceedings. The object of the conference was to afford a means of discussing various matters connected with the development of adult education in the district, either by means of Mechanics' Institutions and kindred societies, or through the agency of night schools. The managers of the Association were also desirous of obtaining a more accurate knowledge of the position and wants of the locality, and they accordingly solicited many of the best practical men to give the meeting the result of their experience, and their advice for the future.

The Noble Chairman, in his opening address, said that, as the meeting was not so much one of a general kind as one of detail, he would not detain them with many observations. They all knew the history of the South Staffordshire Association, and though there was no particular opposition to its progress, yet there was some apathy existing, which it was desirable to remove. Many of the subjects they might have to discuss required some elucidation, though there was no question as to the general importance of the objects of the society, and the appreciation it met with. They were anxious, before the annual meeting, which was announced to be held in a short time, to have some of the chief subjects brought forward, and therefore papers would be read upon various questions which occupied the interest of the members, and discussion would be invited. The papers, he understood, had been prepared with great care, and he hoped they would be in such a form as that they might on an early occasion be printed and circulated. As chairman, it would be simply his duty to call upon the gentlemen present who were prepared with papers to come forward, and the one by Mr. Hague, of Bilston, on "Recreation and Amusements in connection with Mechanics' and Kindred Institutions and Night Schools," would come first.

The paper read by that gentleman had reference to certain experiments made in providing amusement for working men, some of which were, from various causes, failures. He enumerated, amongst others, the Bilston Working Men's Association, which at first did not succeed. Eventually, they hit upon a means of carrying it on with success, and this was by providing

amusements of various kinds in the school-rooms, and in these amusements the inhabitants generally took part, all classes rendering what assistance they could. Concerts, other amusements, and a free-and-easy on a Saturday night, enabled them to carry on their association without difficulty. They tried patronage and it failed, for working men did not like patronage,—they did not want patting on the back. At present they were going on well, and they would be glad to receive visits from the friends in the district. Mr. Hague went on to dwell upon the facility of providing amusements by making amateur talent available. There were many excellent amateurs who were exceedingly kind-hearted, and only required to have the matter placed before them in a right light to make them readily give their services; for public performances in many cases were alike an advantage to the amateur performers and audience. He was quite aware that there were some amateurs who were so highly educated, and whose musical susceptibilities were so delicate, that they could not well expect them to come forward and submit to an indifferent musical performance. He wished that the state of things rendered such a condition impossible, and that music was so generally cultivated, that even the village choirs should be enabled to execute music in such a manner as to enrapture the hearers. Mr. Hague concluded his paper by an eloquent allusion to the beauties of music, and an energetic enforcement of the necessity for providing suitable amusements for the working man, who would have amusement and recreation; and, if it were not provided of a salutary character, would procure for himself what would probably be more prejudicial.

The Rev. T. H. Campbell read a paper on "Saturday Evening Concerts." The rev. gentleman detailed the history of Saturday Evening Concerts at Wolverhampton, as commenced last winter. These concerts were held at St. George's Hall, Wolverhampton, a building capable of seating 1,600 persons, and of holding about 2,000. Fifteen of these concerts were given, the attendance being on every occasion large, there having been at times upwards of 1,500 and 1,700, and on one occasion upwards of 1,800 persons present. After commencing these concerts at prices of admission exceedingly low, it was found desirable to have some shilling seats, and this had a very good effect. The performers gave their services, and the entertainments were highly successful. It had been stated that many, who formerly spent their Saturday evenings in public houses, left their old pursuits, and took to the concert room; and the police statistics showed that during the concert season the returns of drunkenness on a Monday were considerably less than they were previously. The financial result of the concerts was very satisfactory, the total receipts having been £339, and the expenses £212 14s., leaving a balance of £186 6s., to be devoted this season to some object for the benefit of working men. They had the voluntary assistance of eight bands and 140 ladies and gentlemen, and the great success which had attended them was an ample encouragement to the committee to resume them next winter. In the course of some conversation which ensued respecting the effect of these concerts generally upon public-houses, allusions were made to the introduction of draughts, chess, and music in those houses, and the chairman remarked that he was glad to hear of an improvement in that respect. They could not altogether supersede public-houses, and they should therefore try to improve them.

The number of subjects to be discussed prevented the adoption of a formal resolution on each of the points introduced; but it was the general impression of the meeting, that suitable amusements should by all means be provided by managers of Institutions for their members, and these amusements should be of a varied and comprehensive character.

Mr. J. N. LANGLEY (Wolverhampton) read a paper on "Working Men's Colleges." The causes of the original establishment of these establishments were chiefly re-

viewed, the turbulent year of 1848 being referred to as a time when it was forcibly felt that something must be done to meet the demands made by the working classes for an improvement of their condition. The result of these demands was the establishment of the Metropolitan Working Men's College, in November, 1854, when 140 students were entered, and that number had increased to nearly 400. The establishment at Wolverhampton, with which he was connected, was opened in October, 1857, and it was now nearly in its sixth year. In speaking of his experience of that Institution, he spoke very thankfully of its effect upon himself, as the pursuits inculcated had taught him to rise out of himself, as he contemplated the interesting spectacle of so many who sought to overcome the obstacles which circumstances had thrown between them and the higher branches of education. Mr. Langley detailed the routine of the college, and alluded to its constitution and its working. The expenses were not great, the cost last year being scarcely £75, and they received upwards of £33 in fees. In the course of the reading of the paper the name of the Rev. Mr. Maurice was warmly eulogised. The noble chairman remarked upon the great amount of good Mr. Maurice had done, the many works he had written, and the eminently practical tendency they had, and he had no doubt as to the salutary effect which had been the result of his labours, an effect which would go on increasing. In the course of the conversation which ensued, Mr. Langley said he had omitted to mention the name of Mr. Bayley, a Dissenting minister in Sheffield, who was Mr. Maurice's forerunner in the work, having established a Working Men's College in Sheffield. A very interesting anecdote was related relative to a young man, who, until he was twenty years old, did not seem to be fitted for any occupation. He was induced to attend the Working Men's College, London, and there, in consequence of the teaching of Mr. Ruskin, he became very efficient as a drawing-master, and at present held a position in that capacity in one of the most eminent private establishments in London. Lord Lyttelton was glad to have heard this. He was not aware that Mr. Ruskin had condescended to teach at a working man's college, but the incident just related showed how a great genius could develop powers in others, which, until their contact with such genius had remained latent. Mr. Langley afterwards stated that the number of students who had passed the Wolverhampton College was 349.

The Rev. J. W. GRIER read the next paper, a most interesting and valuable one, upon "Special Classes in Institutions." He recommended that writing and composition should be among the first subjects taught. Foreign languages, mathematics, political economy, bookkeeping, &c., were also of great importance. If the working classes only possessed a knowledge of political economy they would avoid those courses which led to calamitous consequences.—Mr. Fuller, of Wolverhampton, addressed the meeting upon the subject of this paper, and in the course of his observations strongly enforced the study of English grammar. It was a notion too prevalent amongst some that the study of the grammar of our own language was of too elementary a character to attract the attention of those who had arrived at mature years. Such, however, should not be the case, as it was a matter of very great importance. He commended to the attention of the meeting classes for the study of chemistry; and in another portion of his speech expressed himself in favour of having good paid teachers, as it was difficult to get efficient teachers without paying them. He drew a definite line between teachers and lecturers, expressing his decided admiration of the former over the latter. Lord Lyttelton, in speaking upon this point, remarked that the effect of lecturing was somewhat indeterminate and uncertain; and though there were many who were professional lecturers who went about from one end of the world to the other pursuing their calling, it was difficult to ascertain what was the result. In teaching classes, somewhat of the result might be ascertained, and one was almost disposed

to wish that persons who lectured should show that they had some qualification for lecturing, or else not be allowed to lecture at all. The Rev. T. H. Campbell suggested that the effect of lecturing was to lead to inquiry. He thought it was due to urge thus much on behalf of the poor lecturers.

The Rev. J. H. THOMPSON (Cradley) read a paper on "Night School Difficulties and Failures." Among the causes of failure were mentioned the inconveniences arising from sending young people out at night, the absence of the necessary control over them after dark, the short time they usually attended at the schools, the want of encouragement to teachers on the part of the Government, and the absence of inducements to regular attendance on the part of pupils. To meet these difficulties the rev. gentleman pointed out certain means which he suggested for adoption, and made a very practical address.

Mr. CRABTREE (Gold's Hill) read the next paper, which was upon "Night School Management." He laid down certain practical rules for the teachers of night schools, suggesting a more careful classification of pupils, punctuality on the part of the teachers, &c., the object of the paper being to offer to the voluntary and inexperienced the best modes of giving instruction in the various subjects usually taught in evening schools; it was mainly occupied in practical advice on the management of adults, and the best manner of instructing them. As many night school teachers were present, the paper will doubtless be productive of much good.

Mr. WARD (West Bromwich) read a paper on "Institution Night Schools." This paper had especial reference to the qualifications of teachers, and their being strictly kept to their respective departments, also to the necessity of studying the various dispositions of the pupils, in relation to the course to be adopted towards them in cases of insubordination and conduct of a similar nature. As for the general course of education, good reading and writing, and arithmetic as far as the rules of proportion, and geography, were mentioned as the first subjects which should be taught; then they might go on to English grammar. Care should always be taken to teach principles as well as practice, a knowledge of the principles being given first. This might make the teaching appear slow, but it would eventually be the most productive.

Mr. J. WILLIAMS (Dudley) read a paper on the same subject. The paper contained an allusion to night schools connected with the Dudley Mechanics' Institute, the number of pupils in attendance being about 65, and the cost for each session of about six months about £20, exclusive of gas. A discussion ensued, in the course of which the difficulties attending night schools in rural districts were alluded to, and the immense waste of teaching power, which seemed almost inevitable. A question was asked as to the desirability of giving prizes to night schools. It was stated that though the giving of prizes was attended with inconvenience, yet there were certain advantages thereby conferred which fully counteracted such inconvenience. Mr. Langley said that with respect to the giving of prizes, in the Wolverhampton Working Men's College, and that in London, prizes were not given. In reference to prizes generally it did not seem that there was any great objection to the giving of local prizes, except its exhaustive tendency upon the funds. The great difficulty was always to get enough money to carry on the schools.

"Young Men's Clubs" formed the subject of the next two papers. The one by the Rev. G. Fraser, of Wolverhampton, pointed out that a certain class of young men existed who neither cared for a public house nor night school, but for whom it was necessary to provide a warm and comfortable room, and means of quiet enjoyment together. There was such a club in Wolverhampton, which was described in detail. Upon the same subject, Mr. Jones, the secretary, read a paper by the Rev. G. D. Boyle, of Handsworth. This paper alluded to the fact that it seemed almost impossible to make all young men fond of intellectual pursuits. For many, means of

enjoyment and recreation must be found free from the evils of the public house. It was desirable to have young men's clubs, and the writer suggested that the first rule should be that all the members should be *bonâ fide* young men of good character. There should be two rooms, one for conversation, pipes, and coffee (the moderate use of beer had been tried at Worcester and failed), the other for reading and writing letters. These rooms should be opened every night, and Mr. Boyle did not object to the latter room being opened on a Sunday evening. The management of such a club should be entrusted, as far as possible, to the members themselves. They objected to patronage, and should be led to feel that they could independently enjoy themselves, not because such enjoyment was good for the poor, but because they saw that the more wealthy classes enjoy themselves freely and rationally. A club of such a nature was in existence at Handsworth, where bagatelle was permitted, of course with strict rules respecting the exclusion of money stakes, and the club was found to work satisfactorily. The reading of the paper was greeted very warmly.—Lord Lyttleton considered the subject a most interesting one. It was a pity the club at Worcester had failed, but they ought to consider the matter deeply. The subject was different from one of recreation; it was one connected with the provision of a home, as it were, for young men. They ought to try and clear up the difficulty, and ascertain why it was deemed necessary to put so many restrictions upon them. There was a club for young men at Hanley Castle, near Worcester, under the auspices of Sir E. Lechmere, and there young men lived, and could procure anything they chose. It was true that they could not buy beer there, but they could send out for it, and might have just what they liked, almost similar to the clubs in London, where gentlemen could go and live from morning till night. His Lordship expressed a wish that they could establish some club in which they could leave out the restrictions so generally imposed. The club at Hanley Castle was managed by the members themselves. Sir E. Lechmere merely superintended it. An interesting discussion took place, which elicited remarks from various gentlemen, generally opposed to the introduction of beer to young men's clubs.

The last paper was read by Mr. Jones, the secretary to the association, the subject being "Accommodation and expenditure in Mechanics' Institutions." The paper suggested various improvements upon the present style of institutions, with some original ideas for establishing institutions in small towns and villages. Various useful suggestions were also added for providing funds for the purposes of such institutions.

A discussion followed, and after some formal proceedings, the following resolutions were put and carried unanimously:—"That the best thanks of this meeting be given to the Right Hon. Lord Lyttleton, for presiding on this occasion;" "That the best thanks of this meeting be given to the committee of the School of Art, for the use of the room for this conference." The meeting broke up at about nine o'clock, and it was stated that the annual meeting of the society would be held at Wolverhampton, on Tuesday, the 23rd of September, instead of Monday, the 22nd, as previously announced.

THE BRUSSELS SOCIAL SCIENCE CONGRESS.

The Brussels meeting of the International Social Science Association, to commence on the 22nd inst., promises to be a complete success, about 800 members from different countries being already inscribed to take part in the proceedings. Great preparations are being made for the reception of the numerous foreigners expected to attend the meeting, for the purpose of which the Government has appropriated the Ducal Palace, formerly the residence of the Prince of Orange. Arrangements have been made

whereby members have the privilege of travelling to and from the Congress at half the usual fares, on the London Chatham and Dover, the South-Eastern, Northern of France, and Belgian railways. This privilege is obtainable in England by paying a year's subscription (16s.) to the Association, which will be received, and cards of membership given in return, at 3, Waterloo-place, London. On Monday, the 22nd, the Circle des Arts will offer the members a splendid *fête* in their beautiful building on the Grand Place, called *la Maison du Roi*; and on Wednesday, the 24th, the city of Brussels will give a magnificent entertainment in the Hotel de Ville, when the whole of that noble example of Gothic architecture will be thrown open. The proceedings will be wound up on the following evening by a grand banquet, also to be given at the Hotel de Ville. The experience of M. Corr Vandermaeren in similar organisations promises well.

THE DECIMAL SYSTEM OF WEIGHTS AND MEASURES.

The report of the select committee appointed to consider the practicability of adopting a simple and uniform system of weights and measures has just been published. The following recommendations have been laid before the House, together with a great mass of evidence and tabular appendices:—

"1. That the use of the metric system be rendered legal. No compulsory measures should be resorted to until they are sanctioned by the general conviction of the public.

"2. That a Department of Weights and Measures be established in connection with the Board of Trade. It would thus become subordinate to the government and responsible to Parliament. To it should be intrusted the conservation and verification of the standards, the superintendence of inspectors, and the general duties incident to such a department. It should also take such measures as may from time to time promote the use and extend the knowledge of the metric system in the departments of Government and among the people.

"3. The Government should sanction the use of the metric system (together with our present one), in the levying of the Customs' duties; thus familiarising it among our merchants and manufacturers, and giving facilities to foreign traders in their dealings with this country. Its use, combined with that of our own system, in Government contracts has also been suggested.

"4. The metric system should form one of the subjects of examination in the competitive examinations of the Civil Service.

"2. The *gramme* should be used as a weight for foreign letters and books at the Post-office.

"6. The Committee of Council on education should require the metric system to be taught (as might easily be done) by means of tables and diagrams in all schools receiving grants of public money.

"7. In the public statistics of the country quantities should be expressed in terms of the metric system in juxtaposition with those of our own, as suggested by the International Statistical Congress.

"8. In private Bills before Parliament the use of the metric system should be allowed.

"10. The proviso in the 5th and 6th William IV., cap. 63, clause 6, allowing the use of 'local and customary measures' in cases where the vessels employed 'is not represented as containing any amount of imperial measure, or of any fixed local or customary measure heretofore in use,' should be repealed as giving facilities to evade the statute.

"11. The department which it is proposed to appoint should make an annual report to Parliament."

FRENCH AGRICULTURE.

Official tables prepared by the French Minister of Agriculture, Commerce, and Public Works show that the area of land cultivated with wheat in each department of France at the date of the recently collected returns was as follows:—Ain, 201,908 acres; Aisne, 268,006 acres; Allier, 158,208 acres; Basses Alpes, 142,082 acres; Hautes Alpes, 46,092 acres; Ardèche, 47,154 acres; Ardennes, 147,782 acres; Ariège, 53,266 acres; Aube, 170,716 acres; Aude, 176,746 acres; Aveyron, 125,152 acres; Bouches-du-Rhône, 114,460 acres; Calvados, 218,510 acres; Cantal, 11,172 acres; Charente, 208,010 acres; Charente Inférieure, 305,270 acres; Cher, 179,762 acres; Corrèze, 39,292 acres; Corsica, 107,336 acres; Côte-d'Or, 266,808 acres; Côtes-du-Nord, 140,916 acres; Creuse, 10,760 acres; Dordogne, 270,808 acres; Doabs, 117,194 acres; Drôme, 239,258 acres; Eure, 234,574 acres; Eure-et-Loir, 208,108 acres; Finistère, 74,260 acres; Gard, 103,974 acres; Haute Garonne, 257,774 acres; Gers, 331,028 acres; Gironde, 168,044 acres; Hérault, 108,818 acres; Ile-et-Vilaine, 211,276 acres; Indre, 171,632 acres; Indre-et-Loire, 204,618 acres; Isère, 188,528 acres; Jura, 123,028 acres; Landes, 56,372 acres; Loir-et-Cher, 157,636 acres; Loire, 58,142 acres; Haute Loire, 35,764 acres; Loire Inférieure, 231,578 acres; Loiret, 161,600 acres; Lot, 177,520 acres; Lot-et-Garonne, 284,658 acres; Lozère, 51,112 acres; Maine-et-Loire, 327,766 acres; Manche, 219,156 acres; Marne, 246,142 acres; Haute Marne, 199,490 acres; Mayenne, 185,164 acres; Meurthe, 205,326 acres; Meuse, 230,434 acres; Morbihan, 89,318 acres; Moselle, 187,554 acres; Nièvre, 138,972 acres; Nord, 270,580 acres; Oise, 197,828 acres; Orne, 148,766 acres; Pas-de-Calais, 271,192 acres; Puy-de-Dôme, 131,572 acres; Basses Pyrénées, 114,808 acres; Hautes Pyrénées, 53,426 acres; Pyrénées Orientales, 37,716 acres; Bas Rhin, 113,492 acres; Haute Rhin, 77,838 acres; Rhône, 70,846 acres; Haute Saône, 147,088 acres; Saône-et-Loire, 263,430 acres; Sarthe, 139,976 acres; Seine, 11,188 acres; Seine Inférieure, 239,794 acres; Seine-et-Marne, 199,356 acres; Seine-et-Oise, 185,708 acres; Deux Sèvres, 190,350 acres; Somme, 193,472 acres; Tarn, 170,636 acres; Tarn-et-Garonne, 197,191 acres; Var, 171,192 acres; Vaucluse, 130,422 acres; Vendée, 259,948 acres; Vienne, 221,986 acres; Haute Vienne, 44,960 acres; Vosges, 107,530 acres; and Yonne, 222,338 acres. The extent of land cultivated with wheat in France thus appears to have been 13,970,000 acres, and the average yield being 20.46 bushels per acre, it follows that the average wheat crop of France stands at 35,728,275 qrs. In 1840 the surface of land cultivated with wheat was 11,174,000 acres, and the average yield per acre was only 18.66 bushels. It must be remembered, with reference to this large wheat production, that the French consume probably a larger relative quantity of bread per head than the English.

Home Correspondence.

EVENING CLASSES AT MECHANICS' INSTITUTIONS.

Sir,—It is now about the time to commence active operations in those Institutions which make class instruction an important feature, and serious consideration should be given as to the best means of making the evening classes partially available for their special objects. In the North it has been found, as is no doubt the case elsewhere, that there is a great want of elementary instruction, and though there is often a difficulty in finding teachers able and willing to undertake the duty, yet the difficulty is not insurmountable. Wherever the services of practised teachers from parochial or similar schools can be procured, it is advisable to pay them by a certain pro-

portion of pupils' fees, so that they have an interest in increasing the number, and thereby benefiting the Institution. If, for instance, the pupil pay three pence a week—and in most places this is not too high—the teacher would receive two pence for each, and, provided the teacher be a really competent man, this system will be found to work well.

There are, however, many places where such aid cannot be obtained, and then it would be advisable for four or five Institutes, situated at convenient distances, to join in paying an adequate salary for the services of one good master. At each Institute he should have three or four unpaid assistants, and by attending one evening a week at each place, he might, if an able man, maintain all the classes in efficiency.

Care should be taken that the Institution have an especial object in training the pupils to some one or more definite branch of knowledge. In the elementary classes they would, of course, be taught reading, writing, and arithmetic, to which should be added the rudiments of history and geography, and a knowledge of gospel history, so as to train them for the Elementary Examinations in connection with the Society of Arts. This would be an excellent preparation for studies of a more advanced character; and classes should be formed of the older pupils for one or more of the subjects comprised in the Society of Arts' Programme of Examinations. Were this course more systematically pursued, we might reasonably expect a still greater increase in the annual number of candidates, and a substantial basis given to such an admirable stimulus to national education of a sound and useful character.

It is of great advantage to our rising population that the Society of Arts annually tests their intellectual attainments, stamps their value with a certificate, and incites them to exertion by valuable prizes, crowned with the munificent gift of her Majesty. But the work which makes these advantages attainable—the real preparation for future benefit—must be done by steady application and persevering industry in the evening classes of the Institute. To these, therefore, the managing committees should turn their attention, for on them depends the work of organization. Upon them depends the provision of competent teachers; and they should, by every means of publicity within their power, make known the many advantages to every one within their influence.

I am, &c., BARNETT BLAKE.

Leeds, Sept. 15, 1862.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, September 5th, 1862.]

Dated 27th August, 1862.

- 2370. A. Crichton, Glasgow—Imp. in looms for weaving ornamental fabrics.
- 2372. H. Harben, Oxford-villa, Haverstock hill—Imp. in the manufacture of paper and other productions in which fibrous material is employed.
- 2374. R. Sims, Leigh, Lancashire—Imp. in machinery or apparatus for pulping, stripping, or slicing turnips and other vegetable substances.
- 2378. W. M. Mayes, Hoxton—An imp. in or addition to wheels, particularly applicable to the wheels of railway and other carriages.
- 2380. W. E. Newton, 66, Chancery-lane—An improved method of producing light for the various purposes of artificial illumination. (A com.)
- 2382. A. V. Newton, 66, Chancery-lane—Improved machinery for printing from engraved plates. (A com.)
- 2384. J. J. Potter, 3, New Bridge, Dover—Imp. in upright pianofortes.

[From Gazette, September 12th, 1862.]

Dated 30th April, 1862.

- 1278. A. Prince, 4, Trafalgar-square, Charing-cross—A new composition for casting, to represent marble. (A com.)

Dated 21st July, 1862.

2074. A. Naudain, West Farms, J. Peacock, Morrisania d W. H. Walton, New York—Imp. in looms for weaving an kinds f textile fabrics.

Dated 31st July, 1862.

2176. W. E. Newton, 66, Chancery-lane—Imp. in lubricating compounds. (A com.)

Dated 12th August, 1862.

2252. J. Ramsbottom and G. Hacking, Accrington, Lancashire—Imp. in machinery or apparatus for measuring and registering the flow of water and other fluids.

Dated 13th August, 1862.

2269. J. R. Tussaud and F. C. Tussaud, Marybone-road—Imp. in the treatment of representations formed from wax, or from compositions of wax with other matters.

Dated 14th August, 1862.

2286. G. White, Torquay, F. Buckland, Newton Abbott, and C. Rees, Newton Bushell, Devonshire—Imp. in the manufacture of water closets.

Dated 15th August, 1862.

2300. A. Shepard, 55, Victoria-street, Westminster—Imp. in obtaining light, and in apparatus connected therewith.
2304. J. Carter and J. Maher, Victoria Mills, Lockwood, near Huddersfield—An imp. in the construction of power looms.

Dated 25th August, 1862.

2361. M. J. Haines, 4, Victoria-road Rope Walk, Bristol—Imp. in the manufacture of driving bands or straps.

Dated 26th August, 1862.

2366. T. Richardson, Newcastle-upon-Tyne, and R. Allinson, Moor-gate-street—Imp. in the manufacture or treatment of articles of steel, and in the apparatus employed therein.

Dated 28th August, 1862.

2388. G. Biddle, Birmingham—An imp. or imps. in the manufacture of brooms.
2390. E. Lachenal, Little James-street, Bedford-row—Imp. in gas meters. (A com.)
2392. G. Cooke, Mornington-crescent, Hampstead-road—An improved apparatus for securing or fastening doors to prevent robbery or intrusion.

Dated 29th August, 1862.

2394. P. L. Guilbaud and N. V. Thire, Paris, 60, Boulevard de Strasbourg—An improved self-inking hand stamp.
2396. F. H. Lefranc, Paris—Imp. in the manufacture of casks.
2398. J. Davis, Liverpool—Imp. in the manufacture of spoons, forks, and similar articles. (A com.)
2400. G. W. Dyson, Tinsley, Yorkshire—Imp. in machinery for finishing and polishing circular metal rods, bars, and shafts, applicable also to the manufacture of metal tubes and pipes.
2404. W. Upfill, W. Morton, and W. Asbury, Birmingham—Imp. in the construction of wheels and axletrees for carriages.

Dated 30th August, 1862.

2406. E. T. Hughes, 123, Chancery-lane—Imp. in the manufacture of woven fabrics, and in apparatus employed therein. (A com.)
2408. F. Le Conte, 10, Rue des Tarisses, Tourmay, Belgium—Imp. in the construction of furnaces for steam boilers used in sugar mills, distilleries, breweries, and other mills or factories.

Dated 1st September, 1862.

2414. J. Walker, Glasgow—Imp. in the treatment of kelp, and in the manufacture of products therefrom.
2416. J. Ellis, Old Market-street, Bristol—Imp. in corsets.

Dated 2nd September, 1862.

2424. D. B. Peebles, Edinburgh—imp. in wet gas meters.
2426. W. Hunt, Tipton, Staffordshire—An imp. or imps. in the manufacture of muriate of ammonia.

2428. R. Glanville, Bermondsey—Certain imp. in marine and other engines.

2430. W. Roberts, Millwall—Imp. in apparatus for regulating the amount of water discharged by a pump, chiefly applicable for regulating the amount of water fed to a steam boiler.

Dated 3rd September, 1862.

2434. C. Garton—An improved method of applying heat in the manufacture and refining of sugar, and in malting, hop brewing, distilling, and vinegar making.
2438. W. H. Atkinson, Cavendish Club, Regent-street—Imp. in studs or fastenings adapted to holding together parts of shirt fronts, wrist bands, collars, gloves, and other articles of wearing apparel.
2440. E. Dyson, Little Hulton, near Bolton, Lancashire—Imp. in throstle spinning and doubling machines.

PATENTS SEALED.

[From Gazette, September 12th, 1862.]

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| 2th September, 1862. | 734. J. Weems and W. Weems. |
| 683. J. Cunningham and R. Cunningham. | 738. G. T. Bousfield. |
| 684. J. Hunter. | 739. J. M. Courtauld. |
| 687. J. Wadsworth. | 742. W. Gossage. |
| 692. R. A. Brooman. | 743. T. Waller. |
| 703. G. H. Birkbeck. | 749. J. Banks. |
| 706. L. Gabler and M. Zingler. | 758. S. Slack. |
| 707. G. T. Bousfield. | 760. R. A. Brooman. |
| 708. A. J. Paterson. | 763. R. Hadfield & J. Shipman. |
| 709. M. A. Mur. | 773. B. Samuelson. |
| 711. A. Coles and W. Coles. | 782. D. E. Siebe. |
| 714. C. N. Kottula. | 799. R. Gladstone. |
| 715. G. B. Pettit. | 831. J. H. Johnson. |
| 716. J. Smadja. | 859. W. F. Smith & A. Coventry. |
| 723. G. Hamilton. | 876. C. H. Townsend, J. Young, and J. Hankins. |
| 724. J. Robey. | 915. H. W. Caslon and G. Fagg. |
| 725. W. Pickstone. | 934. W. Clark. |
| 726. J. T. Pendlebury and T. Pendlebury. | 941. J. Newton. |
| 728. A. S. Stocker and A. R. Stocker. | 1044. J. P. Mathias. |
| 730. W. B. Lord. | 1078. G. Fell and W. Haynes. |
| 732. W. Bowser. | 1109. J. Stanton. |
| | 1152. J. Combe. |
| | 1545. G. R. Samson. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, September 16th, 1862.]

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| 26th August. | 2058. M. M. Jackson. |
| 1966. B. Baugh. | 9th September. |
| 1st September. | 2106. J. Bottomley and A. H. Martin. |
| 2015. W. Nelson. | 10th September. |
| 2018. G. Parsons. | 2080. J. Mason. |
| 3rd September. | 2593. A. V. Newton. |
| 2089. W. B. Newton. | 12th September. |
| 2257. J. J. Eagleton. | 2158. E. Jones. |
| 5th September. | 13th September. |
| 2036. E. Blake. | 2083. A. B. Seithen. |
| 2059. J. G. N. Alleyne. | 2108. B. Lauth. |
| 6th September. | |
| 2048. W. Rothwell. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, September 16th, 1862.]

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| 2nd September. | 2088. D. Zenner. |
| 1993. W. H. James. | 2111. J. Willis. |
| 9th September. | 12th September. |
| 2082. J. G. Martien. | 2070. J. H. Tuck. |
| 10th September. | 13th September. |
| 2057. M. Curtis. | 2079. W. P. Thomas. |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4503	Aug. 20	A Tap	Isaac Rider	Bedminster, Gloucester.
4501	" "	Improved Fastener for Wristbands	William Charles Edge	{ 13, Owen's-row, St. John-street-road, Clerkenwell, E.C.
4505	" 25	{ An Expanding Frame for a double series of Photographic Portraits, intended to be folded up and held in ladies' Jockets	Henry Willmott	23, Richmond-street, Birmingham.
4506	" 29	Improved Joint for Pipes and Tubes	Thomas Wilson Gore	Old Whittington, near Chesterfield.
4507	" 30	A Tap	James Barwell	Birmingham.
4508	Sept. 6	Adhesive Stamp Damper	{ George Thomas Wallis George Edwin Smith	Westminster. Bristol.
4509	" 8	Improved Police or other Dark Lantern	George Burt	Birmingham.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 26, 1862.

INTERNATIONAL EXHIBITION OF 1862.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s. ; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

It was the intention of the Council to issue the volume complete in the early part of the present month, but as several of the Reports have not yet been received by Her Majesty's Commissioners, the completion of the entire work has been unexpectedly delayed; the Council, however, unwilling to defer the publication of the Reports already completed, have determined to issue to the subscribers those that have been received up to the present time. When all the Reports are delivered, the parts now about to be issued to subscribers will be exchanged, if uninjured, for the perfect volume, bound or unbound, as desired.

It is expected that the first portion of the reports will be issued to subscribers by the end of this week.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on the 8th October. The cards of invitation have been issued this day.

INTERNATIONAL EXHIBITION OF 1862.—VISITS OF SCHOOLS.

The following is a continuation of the Schools reported to Her Majesty's Commissioners as having entered the Building, from 15th to 18th September, 1862:—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Sept. 15	Belper, Derbyshire ...	Unitarian Sunday ...	Superintendent... ..	50	80
" "	Duffield, do. ...	Church Sunday ...	R. Jeffcock, Esq. ...	30	
" 16	Godstone	Choir... ..	Rev. J. S. Hoare	27	218
" "	Hoddesdon	Grammar	W. Lupton, Esq.	18	
" "	Ramsgate	Choir... ..	Rev. J. H. Davies	27	
" "	Salisbury	National	Mrs. Fowler	28	
" "	Kingsbury... ..	Parochial	Subscription	24	
" "	Hatton-garden ...	St. Andrew's	Committee	45	
" "	Ramsgate	St. George's	Subscription	29	
" "	City of London...	Aldersgate Ward ...	Rev. W. F. C. Webber ...	20	
" 17	West Smithfield ...	St. Bartholomew's ...	Rev. J. Abbiss	6	
" "	Brighton	Christ Church	Rev. J. Vaughan	30	
" "	Egham	Free	Rev. G. Taylor... ..	14	778
" "	Hammersmith ...	Sunday	Jas. Anstey Wild, Esq. ...	102	
" "	Finsbury	St. Alphage	Committee	15	
" "	Wandsworth	Royal Patriotic... ..	Committee	64	
" "	Cornhill	Lime-street Ward ...	Subscription	80	
" "	Ratcliff	Cooper's Grammar ...	Cooper's Company	200	
" "	Stepney	Stepney Union	Subscription	59	
" "	Westminster	Wesleyan Training ...	J. R. Kay, Esq.	35	
" "	St. Paul's Cray, Kent	National	Rev. J. Langdon, and } Richd. Peterson, Esqs. }	37	
" "	Wanstead	Infant Orphan	Subscription	12	
" "	Yorkshire	Caterick Academy ...	Dr. Pollock	30	
" "	Titchbourn-street	St. John's Orphan ...	— Barker, Esq.	8	
" "	Stevenage, Herts.	National	J. Bailey Denton, Esq. ...	29	
" "	Farring-lon-street	British	Committee	12	
" "	St. John's-wood ...	Catholic Industrial ...	Hon. and Rev. G. Talbot..	14	
" "	Paddington	Ragged	Subscription	24	
" "	Deal	St. Andrew's Choir ...	Rev. M. E. Benson	7	

RETURN OF SCHOOLS (*Continued*).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Sept. 18	City of London... ..	Aldersgate Ward	Rev. W. C. F. Webber ...	20	
" "	St. Alban's	St. Stephen's Choir	G. Nicholas, Esq.	20	
" "	Uxbridge	Commercial	Thos. Kempton, Esq. ...	30	
" "	St. Ann's, Soho... ..	Parochial	Subscription	52	
" "	St. Clement's Dane ...	St. Clement's	Mr. Neal	87	
" "	Haskett, Newmarket... ..	Hawbeck	R. Porter Esq.	18	
" "	Wymering, Ports- mouth	National	Rev. G. Nugee... ..	48	
" "	St. Matthew's, City- road... ..	National	Subscription	90	
" "	Tower-hill	St. Botolph, Aldgate	Subscription	47	
" "	Hanwell	National	Subscription	90	
" "	Yorkshire	Caterick Academy	Dr. Pollock	30	
" "	Knightsbridge	All Saints	Subscription	54	
" "	Haverstock-hill... ..	Orphan	Subscription	290	
" "	Clapham-rise	British Orphan Asylum ...	J. K. Welsh, Esq.	134	
" "	North Brixton-road ...	Christ Church Industrial ...	Rev. J. McHenry	13	
" "	Wantage (Bucks)	Choir... ..	Rev. T. Bowles	18	
					1,041

VISITS OF WORKMEN.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building from 15th to 18th September, 1862:—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
Sept. 15	Labourers	Westham	J. Scully, Esq.	25
" "	Mechanics and Labourers	{ Iron Works, Swan Vil- lage, Staffordshire. }	John and Samuel Roberts ...	350
" "	Farm Labourers	Stoke and Hoo (Kent) ...	{ Thos. H. Day, Esq., Mr. W. S. Meers	80
" "	Canvas Weavers	Doncaster	C. J. Fox, Esq.	35
" "	Marble Masons... ..	Warren-st., Fitzroy-square.	A. Boucneau, Esq.	12
" "	Pensioners... ..	Chelsea Hospital	The Commissioners	51
" 16	Outlers	Sheffield	Rodgers and Son	500
" "	Parishioners	{ Woodford, Northamp- tonshire	Rev. C. Smyth	17
" "	Agricultural Labourers	Hornsby, Cambridgeshire ...	Messrs. Banyard & Saunders ...	44
" "	Agricultural Implement Makers ...	Leiston Works, Suffolk ...	Messrs. Garratt	700
" "	Agricultural Labourers	Petistree, Suffolk	W. Walker, Esq.... ..	21
" "	Agricultural Labourers	Hacheston, Suffolk	L. W. Thurlow, Esq.	24
" "	Agricultural Labourers	Iken, Suffolk	J. W. Gobbett, Esq.	20
" "	Pensioners... ..	Chelsea Hospital	The Commissioners	50
" "	Agricultural Labourers	Bricket-wood, St. Albans... ..	R. Harrison, Esq.... ..	34
" "	Farm Labourers	Woodbridge, Suffolk	H. Edwards, Esq.	23
" "	Farm Labourers	Coalend, Southampton ...	A. R. Drummond, Esq. ...	100
" "	Villagers	Histin and Trumpington... ..	Individual Subscription ...	112
" "	Inmates of Workhouse	St. George's, Hanover-sq..	Committee	32
" 17	Brewers' Servants	Chiswick	H. Sich and Co.	35
" "	Garden Labourers	Beeston (Beds)	Mr. Marshall	14
" "	Workmen	Barking, Essex	J. B. Lewis, Esq.	35
" "	Garden Labourers	Chelsea Hospital	Sir A. Woodford	18
" "	Members of Mechanics' Institute ...	Richmond, Yorkshire	E. Wood, Esq., F.G.S. ...	60
" "	Brewers	Writtle, Essex	— Hardcastle, Esq.	44
" "	Agricultural Labourers	Hamondsworth... ..	R. A. Stevens, Esq.	26
" "	Chain Makers	Dudley	J. G. Walker, Esq.	30
" "	Mechanics	Bristol	{ Messrs. Hurdall, Hallier, and Wills }	26
" "	Gas Work Operatives	Bath	The Directors	20
" "	Marble Work Apprentices	Westminster	T. H. Hartley, Esq.	30
" "	Pensioners... ..	Chelsea Hospital	The Commissioners	60
" 18	Agricultural Labourers	Stapleford Abbotts, Essex ...	Subscription	18
" "	Members of Mechanics' Institute ...	Richmond, Yorkshire	E. Wood, Esq., F.G.S. ...	60
" "	Agricultural Labourers	Ringstead, Norfolk	— Sudbury, Esq.... ..	23
" "	Harvest Men	Heighton, Norfolk	{ William Stanton & F. C. Youlder, Esqs. }	44
Total				2,773

CHEMICAL SUBSTANCES AND PRODUCTS
OF INDIA.

The following notes are extracted from the official Catalogue of the contributions from India to the International Exhibition of 1862.

OIL SERIES.

Gurjun oil is obtained in Chittagong, from a large tree, formerly common in the hills of this district; it grows up with a straight stem to the height of 30, 40, and 50 feet before it throws out branches, which grow horizontally, and produce flowers and seeds during the rainy season. The seed may be said to be somewhat winged, the lower part contains the seed, and the upper part is composed of two stiff leaves. If they fall when there is a breeze of wind, they are carried a considerable distance, but so far as it is seen very few of them germinate in a natural state. The oil is obtained by cutting a hole in the tree, about 3 feet from the ground. The cut being about 4 or 5 inches deep into the trunk of the tree. The base is hollowed out to retain the oil. The whole of the hollow is cleared with fire, without which no oil exudes; after it is cleared the oil exudes, and is collected in the hollow at the base, and removed at intervals. The oil is thus extracted year after year, and sometimes there are two or three holes in the same tree, while the tree does not die. The oil is allowed to settle when the clear part separates from a thick portion, which is called the "Guad." If a growing tree is cut down and cut to pieces, the oil exudes and concretes on the stem and ends of the pieces, very much resembling camphor, with an aromatic smell also. It is said that the tree yields from 3 to 5 maunds yearly, i.e., 240 to 400 lbs., and the same tree will yield oil for several years. It is a good balsamic medicine, and is very generally used as a substitute for copaiba; but it would be more valuable as a varnish: it is preservative to wood, to which it gives, with little trouble of application, a fine surface and polish; it becomes, however, white and milky if exposed to wet. It can be had here in large quantities at rupees 10 per maund.

Chalmogree, or seeds of the Gynoo (*Cordia Odorata*), natural order Pongaceæ, is a product of Chittagong. The tree which produces the seed from which this oil is expressed is a slender tree, with very delicate, but tough branches. The leaves are lance-shapen and dark green; the fruit is produced at the ends of the branches. It is very like a wood-apple, but rough, about 3 inches in diameter, and is filled with the seeds, each about an inch long, of an irregular shape, and about 1½ inches in circumference in the thickest part of the kernel, is covered with a thin hard shell of an earthy colour. The seeds are obtainable in the north of this station, but it cannot be stated how much could be procured in any one season. The oil is very successfully used by native physicians for the cure of bad sores.

The Civil Assistant-Surgeon of this station, Dr. Beatson, remarks, "that there is no doubt that the oil expressed from the Chalmogree seeds is a most valuable remedy in leprosy, and in obstinate ulcers of all kinds." He has seen ulcers, both leprosy and non-leprosy, take on a healing action on the application of Chalmogree, after resisting every kind of treatment. The oil obtained in the bazaar is coarse and unpleasant, but as it is now well known and generally used in India, superior specimens can be obtained from other stations.

An oil is extracted from Sheal Katta (*Argemone Mexicana*), a common papaveraceous plant in Bengal. It is also called She-al-katta. The plant from which the oil is obtained is a very common, troublesome weed, growing almost everywhere, on any abandoned heap of rubbish, and found in great abundance in Bengal and Hindoostan; at times with difficulty kept down in fields and gardens. The plant itself is well known, having prickly, thistle-like leaves, and bright yellow flowers. The seed yields a large quantity of oil, nearly as much as the common mustard seed.

Caron Oil is obtained from a crooked tree, growing in wet places near fresh water, very common in the sides of ditches which surround native dwellings. The seed is bean-shaped, and produced in a flat pod: the pods grow several together. The flower is pink and white, of the shape of a bean flower or blossom. The oil is used for burning in native lamps, and in large quantities for boiling with dammer to soften it for the seams and bottoms of ships. It is also often used by native practitioners for the cure of itches. A maund of seeds cost rupees 1-8, and the extraction of the oil by heat costs 8 annas: the oil produced amounts to 6¼ seers per maund.

Nageshur Oil is obtained from the seeds of a tree which grows wild in the jungles in the hills of the Chittagong district, and has been planted many years ago on the sides of the road leading to some of the dwelling houses in the station. The seeds are contained in a strong brown skin, one, two, or three in each. When ripe the skin bursts and the seeds drop out. The seed is covered with a thin hard shell. The oil is an excellent cure for cutaneous diseases, particularly itch.

An oil called Arenda, is obtained from a bush growing in the Chittagong district, which is used for fencing ground; it is readily increased by cuttings, which rapidly take root. The seeds are three or four, contained in a thin skin, which is black; the seed is of the same colour, and grows in branches; the stems of the bushes are not strong, but they answer excellently for fences, with split bamboo tied on each side to keep them straight and together, and the great advantage is that no kind of cattle eat them. The seeds are collected and the oil expressed in the usual way. It is not known that it has any medicinal qualities, neither has any experiment been made. As to its produce it has no price in the market.

An oil called Kurunj is made from the *Geledupa arborea*; and produced in large quantities in Chota Nagpore.

The Surgoojah Oil is in most common use. It is made from a low plant, bearing a yellow flower. It is grown in very large quantities, being a favourite crop, of easy cultivation, and giving good returns.

Roosa or Scented Grass Oil is grown in Jubbulpore; it is extremely difficult to obtain pure. The best is said to be pressed at Ajmere. A miserable imitation of this oil is occasionally manufactured at Sangor. Twenty seers of the grass, which grows wild over the station and district, are mixed with two seers of common Teel oil, and then slowly distilled. The oil thus becomes highly impregnated with the peculiar roosa flavour, and is sold as such at 4 rupees a seer. Grass oil is never taken internally by natives, but they have a great faith in it as a stimulant to the functions of the several organs, when rubbed on externally. They also use it as a liniment in chronic rheumatism and neuralgic pains, but though they place great reliance on its virtues, its expense prevents its being used generally. It has a fragrant aromatic smell, persistent, and very agreeable at first, but after a time the odour becomes unpleasant, and gives many people a feeling of sickness with headache. The natives use it for slight colds also, to excite perspiration, by rubbing in a couple of drachms on the chest before the fire or in the heat of the sun. From information collected, it appears that the pure unadulterated oil has been used by many European officers with most wonderful effect in cases of severe rheumatism; and indeed such appears to have been the effect of its application, that two good rubbings of the pure oil on the part affected, produced such severe burning as to render a third application almost impracticable. In the cases brought to notice, the second application was found sufficient to ensure perfect cure.

Kunjee oil is extracted from seeds obtained from the pods of a bean grown in Jubbulpore. The tree grows to a great height, and is found in the jungles about, as well as in the station of Jubbulpore. It is used by natives for skin-diseases, and the following is Dr. Wilson's opinion regarding it: "Kunjee oil is extracted from the seeds of

a leguminous plant, cultivated in gardens; it is used externally in the treatment of itch, but is far inferior in its effects to sulphur. Internally it is said to be poisonous in large doses."

The *Rolletia tinctoria* (Cuttack) produces the Polang oil. The tree from the seeds of which this oil is obtained, is common in the Pooree district, and not cultivated to any extent elsewhere. It is very productive. The oil is used for burning and to adulterate other oils. It is extracted from the white kernel, found within the seeds or fruit, in the ordinary way. The oil costs about 17s. a maund of 100 lbs.

The *Bassia latifolia* produces an oil, which, besides being burnt as ordinary oils, is used to adulterate, and as a substitute for "ghee" or clarified butter.

Teak oil comes from Sumbulpore. The peculiar oil called chooa oil, is distilled from the jhoona; a few fragrant substances as sandal-wood and "khus-hus" being mixed with the compound. It is used as an unguent by people who can afford to purchase it, and medicinally in cutaneous diseases. The best sort sells at 5 lbs. weight per shilling.

The price of mustard oil is, and has been for some time, 20 rupees per maund, equal to 40s. for every 80 lbs. of oil. Dr. Mouat, the Inspector-General of Prisons in Bengal, directed its use in jails for burning purposes, whereby a saving of 14 rupees in every maund has been effected in the Maldah jail. The oil burns well, and would answer admirably for machinery purposes.

Wood oil, a balsam obtained from the *Dipterocarpus laevis*, is one of the commonest forest trees in Pegu, growing to an enormous size, and yielding as much as 30 gallons of oil each season, without injuring the tree.

The medical properties of this balsam are identical with those of the balsam of copaiba, for which it has been successfully substituted in hospital practice by Dr. O'Shaughnessy and other physicians.

This is only one of its many known qualities, and doubtless others remain to be discovered. It is an excellent solvent of caoutchouc; it has been used as a substitute for fish-oil in curing leather, and found to answer. It makes an excellent house varnish, and the Burmese employ it extensively in the manufacture of torches.

The Nhan-pyai seed is made into oil for lamp and other household use: one basket will give about fifty-five viss of oil.

The Nhan Mai seed is made into oil for lamp and other household use: one basket will give sixty-five viss of oil.

The Poay Ngat is used for caulking boats.

From the wood oil known as Capawa, dammer is made, and a kind of torch used by the poor classes in Moulmein instead of a lamp.

The *Cerbera Theretia* oil is produced in the localities of Calcutta; no mention of the seed yielding this oil is to be found in any books, and as it was not included among the numerous samples submitted at the Great Exhibition of 1851, it is hoped it may be now and well reported on. The difficulty is to get at the kernel.

From the nut of the *Mesua ferrea*, well-known as the iron tree of Assam, the nahar oil is produced.

The *Ricinus communis*, known by the provincial name of "reice," is cultivated as a mixed crop. It is sown in June by almost all the villagers, not extensively, but principally for their own use. Its cultivation can be extended all over Oude. This oil is extracted by bruising the seed and then boiling it in water. The oil is afterwards skimmed off. This is the only seed out of which the oil is extracted by boiling—as in this case it is found cheaper than the method used for other seeds, which is by pressure. The cost of the seed is one rupee per maund, and the price of the oil is from 2 to 5 seers per rupee, according to the abundance of the crop in the season. The proportion of the oil yielded is about half the weight of the seeds boiled; used only for burning.

The *Papaver Somniferum* known as "poshtah," is cultivated in the locality of Lucknow; each ryot sows from 2 to 4 beegahs in the month of October. It is capable of

being cultivated all over Oude. The oil is extracted by the common native press. The cost of the seed is 10 seers for the rupee, and the oil sells for 3 seers for the rupee. Two-fifths of the weight of the seed employed is about the proportion of oil yielded by the native process. The poppy seed is eaten by the natives, made into sweetmeats, provided the opium has been extracted from the seed-vessel, otherwise it is bitter and narcotic, and, under these circumstances, the oil extracted is also bitter; used for cooking and burning.

In Behar this material is one of considerable commercial demand; it is expressed by means of a heavy circular stone, placed on its edge, made to revolve by a long lever, and the apparatus is set to work by draught bucksillo.

The *Linum usitatissimum*, native name "Tisee" or "Alsee" is cultivated as a mixed crop, principally with grain, all over Oude. It is sown in the month of October, and never irrigated. It is never sown thickly, as the object is to get a large amount of seed for oil, and not fibre. It can be cultivated extensively, and there is no doubt that, with proper treatment, profitably for its fibre. The oil is extracted by pressing. The seed sells for 18½ seers per rupee, and the oil for 5 seers per rupee. Every 5 seers of seed yield 1½ seers of oil by the native process of pressing; used for cooking and burning.

The pericarp of the nut of the *Anacardium Occidentale*, called Hegli Badam, contains a black acrid oil, called cardole, and is a powerfully vesicating agent. The oil is also applied to floors and wooden rafters of houses to prevent the attack of white ants.

THE PROPOSED NEW PATENT OFFICE.

The following is the recent report of the Commissioners of Patents to the Lords Commissioners of the Treasury on the subject of building a Patent Office, Library, and Museum:—

"In April, 1855, Lord Chelmsford, Lord High Chancellor of Great Britain, Sir John Romilly, Master of the Rolls, Sir Fitzroy Kelly, Attorney-General, and Sir Hugh M'Calmont Cairns, Solicitor-General, being four of the Commissioners of Patents for Invention under the said Act, reported to your lordships in the words following:

"The 4th sec. of the Patent Law Amendment Act, 1852, enacts, that 'it shall be lawful for the Commissioners of Her Majesty's Treasury to provide and appoint from time to time proper places or buildings for an office or offices for the purposes of the said Act.'

"In pursuance of the requisition of the Lords Commissioners of Her Majesty's Treasury, dated in 1853, the Commissioners of Her Majesty's Board of Works provided certain offices for the Commissioners of Patents, being the ground floor rooms of the Masters' Offices in Southampton-buildings, Chancery-lane, thereto occupied by Masters in Chancery, abolished under the Act 15 and 16 Vict., c. 80; and an annual rent of £490 is now paid out of the Fee Fund of the Patent Office to the Suitors' Fund of the Court of Chancery for the hire of the same.

"This arrangement was not considered to be permanent; no lease has been granted, and as these offices are now required for the occupation of the registrars and other officers of the Court of Chancery, due notice has been given to the Commissioners of Patents, requiring them to give up possession as soon as other suitable offices can be procured.

"These offices were in 1853 sufficient in number and accommodation for the ordinary business of the office.

"In the year 1855 the Commissioners of Patents established a free public library within their office, containing works of science in all languages, the publications made by the commissioners, and the works upon patented and other inventions published in the British colonies and in foreign countries.

"This library has greatly increased and continues to increase, partly by purchases, but in a great measure by

gifts of valuable and useful books. It was resorted to at the first opening by inventors, engineers, and mechanics, as well as by barristers, solicitors, and agents engaged in patent business; it has become a collection of great interest and importance, and the number of readers has so much increased that at this time convenient standing room cannot be found in the two small rooms within the office which can be appropriated to the library. It is the only library within the United Kingdom in which the public have access not only to the records of the patents and inventions of this country, but also to official and other documents relating to inventions in foreign countries, and this without payment of any fee.

"A largely increased accommodation is urgently required.

"No suitable building can be found in the immediate neighbourhood of Southampton-buildings, either to be rented or for purchase.

"The new offices to be provided must be fire-proof, for the preservation of the original specifications and other records of the office; the offices now occupied are fire-proof throughout.

"The Commissioners of Patents are in possession of a collection of very valuable and interesting models of patented machines and implements, as also of portraits of inventors, many of them gifts, and others lent by the owners for exhibition. They are now exhibited daily, and gratuitously, in a small portion of the museum at Kensington assigned to the Commissioners of Patents for that purpose by the Lords of the Committee of Privy Council for Trade.

"A museum of this nature naturally increases, and the number of models now exhibited may be considered as forming only the foundation of a great national museum.

"The great work of printing the old specifications of patents, with the drawings attached thereto, enrolled in Chancery under the old law, dating from 1623 to 1852, and 12,997 in number, was commenced in 1853 and completed in 1858. All have been fully indexed in series and subjects, and the indexes printed and published. These prints of specifications form about 900 volumes (450 imperial octavo volumes of drawings, and the like number of imperial octavo volumes of letter-press). The indexes form seven imperial octavo volumes. These valuable works have cost, in transcribing, printing, lithographic drawing, and paper, upwards of £90,000.

"Notwithstanding this great outlay, the balance sheet of income and expenditure for the year 1857, prepared for the annual report of the commissioners, and laid before Parliament, shows a surplus income from the commencement of the Act, 1st October, 1852, to the end of 1857, of £6,000.

"The balance sheet of income and expenditure for the year 1858 will, no doubt, increase the total surplus to £12,000 or £13,000.

"The work of printing the old specifications being completed, as above stated, the expenditure on that head ceases altogether, and consequently the surplus income of the year 1859 is estimated at £31,000; adding this sum to the available surplus of £12,000, as above stated, and allowing a margin of £3,000, £40,000 may be safely estimated as the sum available for building purposes at the end of the year 1859.

"The Act of 1853 (16 Vict., c. 5) converted all the fees imposed by the Act of 1852 into stamp duties, thereby passing the whole income of the office to the Consolidated Fund. The expenditure of the office is estimated and voted annually by Parliament.

"There is no appearance of diminution in the number of applications for patents, and they may be safely estimated to continue for future years at 3,000 in each year.*

"This number will produce £95,000 in stamp duties, and adding thereto £1,600 for the average annual proceeds of sales of printed specifications, the future annual gross

income may be taken at £96,000. The gross income is, however, liable to a deduction of £18,500 on account of revenue stamp duties, leaving the real available future income of the Patent Office at £78,100* per annum, or thereabouts.

"The Patent Law Amendment Act, 1852 (15 & 16 Vict. c. 83) imposed certain revenue stamp duties upon patents. These duties have hitherto produced £15,300 per annum, and that sum has been charged against the office in the annual balance sheet of income and expenditure. These duties are estimated for future years to produce £18,500,† or thereabouts.

"The work of printing the old specifications being completed, as above stated, the yearly future cost of the current specifications, abstracts of specifications, journals, indexes, &c., in letter-press printing, lithographic printing, and paper, will not exceed‡ £17,500 per annum, as contrasted with the average yearly expenditure on those three heads of £39,375 within the years 1856-7-8.

"The Commissioners of Patents are of opinion that it is not expedient to propose to Parliament a reduction of the scale of stamp duty fees imposed by the Act of 1852.

"They are of opinion that the fees paid upon the passing of a patent are not too heavy; the large number of applications (3,000 in each year) accounting for the large amount of income. Any material reduction in the amount of fees would undoubtedly tend to increase the number of useless and speculative patents; in many instances taken merely for advertising purposes.

"The fee stamp duties and the revenue stamp duties are as follows:—

	Fee stamp duties.			Revenue stamp duties.		
	£	s.	d.	£	s.	d.
Within the first six months from the petition for provisional protection to the filing of the specification	20	0	0	5	0	0
On the patent at the expiration of the third year...	40	0	0	10	0	0
On the patent at the expiration of the seventh year.	80	0	0	20	0	0
(The patent is granted for fourteen years.)						

"There are 3,000 petitions for provisional protection presented in each year or thereabouts. Of this number 1,950 reach the patents, and 250 patents pay the £50 additional stamp duty required at the expiration of the third year; 1,450 patents, or nearly three-fourths of the whole thereby becoming void. Probably not more than 100 of the surviving 550 will pay the £100 additional stamp duty required at the end of the seventh year."

"Considering the beneficial results of the additional payment of £50 in sifting useless patents, the commissioners are of opinion that it is not expedient to reduce the amount, and so long as the surplus can be expended for the benefit of patentees and that portion of the community which is principally interested in and connected with the practical application to public purposes of discoveries and improvements in science and art.

"They are of opinion that the surplus income, calculated as before stated, to amount to 30,000 at the end of the current year 1859, and to increase in each succeeding year at the rate of £20,000 per annum, may be beneficially applied in the purchase of ground in a central situation, and in the erection thereon of a sufficiently spacious fireproof building for the Patent Office and public free library attached thereto; and that the surplus fund may be beneficially applied in the purchase of ground and the erection thereon of a permanent and spacious building for the Patent Office Museum, sufficient ground being taken for the extension of the building, from time to time, as may be required.

* The available income of the Patent Office amounted in 1860 to £92,000.

† The revenue stamp duties produced £18,485 in 1861.

‡ The cost of printing, lithographic drawings, paper, books, and binding, for the year 1861, amounted to £18,800.

* The number of applications in 1861 was 3,276.

"This is the more necessary, inasmuch as models of a most interesting and valuable description lie scattered over the kingdom, in many instances constructed at a great expense, for legal and other purposes, for which the owners have no present use, and many of which occupy a space inconvenient to them. These models, or many of them, would, as the commissioners confidently expect and believe, be presented or entrusted to them for exhibition in such museum, provided the public are allowed free access to it at all reasonable times.

"The Commissioners of Patents therefore request that the Lords Commissioners of her Majesty's Treasury will be pleased to sanction the application of a certain portion of the surplus now derived from the fees paid on patents for the purpose of accomplishing the objects above mentioned, and that with this view their lordships will be pleased to give the necessary directions to her Majesty's Board of Works, to obtain a proper site for the proposed new Patent Office and library, to be selected with the approbation of the Commissioners of Patents and with the sanction of the Lords Commissioners of her Majesty's Treasury, and also to prepare the necessary plans, elevations, and specifications for this purpose, also to be submitted to the Commissioners of Patents for their approval, and to make contracts for the building of the same when approved.

"If their lordships consent to these proposals, the Commissioners of Patents have to request that a sufficient sum for the purpose, so far as the same may be required for the year 1858-9, may be included in the estimate to be laid before Parliament in the present session for Patent Office expenses."

This report was, immediately on the receipt thereof by their lordships, transmitted by them to her Majesty's Board of Works, with instructions that a convenient site should be provided for the proposed new offices, public library, and museum, and also that plans and estimates should be prepared for Parliament.

In 1859 the Lords Commissioners of her Majesty's Treasury and the Chief Commissioners of her Majesty's Board of Works approved of a site for this purpose, lying at the northern extremity of the gardens of Burlington House, and thereupon plans and estimates were prepared for the new Patent Office and library, by Messrs. Banks and Barry, the architects appointed by the Board of Works, which were so arranged as to form a portion of one complete design for the appropriation of the whole site of Burlington House and gardens for various public buildings. This plan was, however, suspended or altogether abandoned on the change of government in that year (1859), and no other site has since been provided.

The space required for these buildings may be estimated from the following circumstances:—It is considered by the Commissioners of Patents to be highly desirable, and indeed necessary, that the Patent Office Museum should be so constituted as to become an historical and educational institution for the benefit and instruction of the skilled workmen employed in the various factories of the kingdom. These persons constitute a class which largely contributes to the surplus fund of the Patent Office in fees paid upon patents granted for their inventions. Amongst the various things necessary to be done in order to accomplish this object, it is considered to be of great importance that machines and exact models of machines, in subjects and series of subjects, showing the progressive steps of improvement in each branch of manufacture, should be exhibited. For example, taking the case of steamboats, in order to show the rise and progress of this invention, it is necessary to exhibit in a series of exact models of machines, or by the machines themselves, each successive invention and improvement in steam propellers, from the first engine on the paddle system that drove a boat of two tons burthen to the powerful machinery of the present day on the screw system in first-rate ships of war. Accordingly the present museum presents a very interesting collection to elucidate this subject. The

original small experimental engine that drove the boat of two tons burthen above referred to, is now in the museum, and stands the first in the series of propellers and models of propellers; and in order to explain how the existence of such a museum is the cause of its becoming daily more perfect, it may be useful to state that in this branch the following valuable and interesting original machines and models of machines have lately been added to the museum, either by the gift of the proprietors or at a very trifling expense:—

First, a perfect model of Trevethick's locomotive engine, the first engine that ran upon common roads, in 1803.

Secondly, an original stationary and pumping engine, made on Newcomen's principle, to which Watt applied his important invention for condensing, by the means of a separate vessel and air pump, the steam that had been used and formerly condensed in the cylinder.

Thirdly, the original fixed engine made by Watt in 1788 for converting rectilinear into circular motion, in order thereby to drive mill work by the use of his invention known as the sun and planet motion. These two last-mentioned engines drove for many years the machinery used at the Soho Works of Messrs. Bolton and Watt, near Birmingham.

Fourthly, the very early original locomotive engine, brought from the Wylam Colliery, in Durham, the first engine which moved by the contact of smooth wheels on smooth rails. This engine was worked at the colliery nearly fifty years, commencing in 1813.

And fifthly, the original, "Rocket" locomotive engine made by George Stephenson and worked at the opening of the Liverpool and Manchester Railroad in 1829, which unfortunately was the cause of Huskisson's death.

These instances are selected from one division of the museum, and are enumerated for the purpose of pointing out, in the first place, the value of such a museum in an historical and social as well as in a scientific point of view, and in the second place, the large space that must necessarily be required for the purpose of their accommodation, in such a manner as to enable those who wish to study them to be able to do so without difficulty or inconvenience. It is also to be borne in mind that the number of the models and machines will increase rapidly, year by year, and consequently that a large additional space of ground should be secured for the future extension of the museum.

The commissioners are also in possession of a large number of valuable models, which still remain in cases, because room cannot be found for their exhibition in the space assigned to them in the museum at South Kensington; indeed, so limited is that space, that they are obliged to postpone the acceptance of many valuable models offered as gifts by manufacturers and inventors. Several good models of machines have also, for the same reason, been lately removed to afford room for machines of a higher degree of interest.

The public library at the Patent Office is in the same crowded condition; the books daily increase in number, and many remain in cases, for the reason that shelf-room cannot be found for the books, and still less accommodation for the readers.

The inconvenience arising from this source is accurately pointed out in a memorial, presented to the Commissioners of Patents on the 22nd of July last, and signed by forty-six gentlemen, consisting of eminent mechanical engineers, chemists, manufacturers, inventors, and agents, who are readers in the public library of the Patent Office. A copy of the memorial, so far as it relates to this subject, is appended to this report.

In connection with the erection of the necessary buildings for the objects above specified, a most important consideration is the spot to be selected for that purpose. The readers in the library being of the class of scientific persons, barristers, mechanical engineers, chemists, inventors, skilled workmen in the various factories, solicitors, and patent

agent, it is obvious that the readers should be enabled to read the books and examine the machines and models at the same time and in the same place, and, consequently, that the Patent Office, Public Library, and Museum, should be either under the same roof or in very close proximity, and also that the spot to be selected should be of easy access to the class of persons above referred to.

The proposed site for the Patent Office Buildings in Burlington House-gardens having been abandoned, as above stated, the Commissioners of Patents, in the following year (1860), proposed to your lordships, Fife House in Whitehall as a convenient site for the Patent Office Buildings and Museum, and one that would unite all the necessary requirements already referred to. This proposal was favourably considered, and a minute of the treasury was transmitted thereon to the Board of Works. It was found, however, that until the question of the embankment of the river and the roads of access to the main river-side road should have been settled by Parliament, no appropriation of that site for building purposes could be made.

This difficulty is now removed. The several roads have been set out and definitively fixed by the Thames Embankment Act of the present session, and it is consequently now open to her Majesty's Government, if it shall think fit to do so, forthwith to appropriate the site of Fife House for the erection of the proposed Patent Office buildings.

The Crown leases of Fife House and the several buildings adjoining thereto have lately expired, and therefore the whole property is now at the disposal of her Majesty's Commissioners of Woods and Forests in right of the Crown; and the Commissioners of Patents are informed that the site proposed can be obtained either by purchase or on a Crown building lease.

The plan attached to this report shows the road of access from Whitehall to the river-side main road, and the site proposed to be taken (the Patent Office Library and Museum marked A. and coloured red); also the land to be reclaimed by the embankment marked B. and coloured green) proposed to be reserved and appropriated for the extension of the museum in future years.

The surplus income of the Patent Office, applicable to building, amounts in the aggregate to £129,000. The Commissioners of Patents do not propose to ask your lordships to apply for building purposes any portion of this sum which has already been received and has formed part of the general revenue of the country, but merely that the surplus income of the present year (1862) and that of succeeding years should be applied for the purposes above enumerated.

The surplus income of the current year (1862) is estimated at £40,000.

The Commissioners of Patents therefore earnestly request that your lordships will be pleased to sanction the appropriation of the site proposed by them for the Patent Office Buildings; that your lordships will be pleased to give the necessary directions to her Majesty's Board of Works to obtain the proposed site, either by purchase or by a lease from the Crown, and to direct the architects to prepare the necessary plans, elevations, and estimates; and, further, that your lordships will be pleased to direct such plans, elevations, and estimates to be laid down before Parliament at the commencement of the ensuing session; and to apply for a vote for such proportion of the estimated cost of the buildings as may be required for the year 1863-4; and, should it be decided to purchase the land for the site, also to apply to Parliament for the sum of money necessary for that purpose, all such moneys to be repaid out of the surplus income for the current and succeeding years.

Dated 7th August, 1862.

WESTBURY, C.
JOHN ROMILY, M.R.
WILLIAM ATHERTON, A.G.
RUSSELL PALMER, S.G.

STEAM FIRE ENGINES.

A self-propelling steam traction and fire engine, made by Mr. W. Roberts, of Messrs. Brown, Lenox, and Co.'s works, Millwall, for Messrs. J. C. Mare and Co., was tried on Friday last, at Mr. Hodges' distillery, Church-street, Lambeth. The engine weighs, in working trim, and including 5 cwt. of coal and 40 gallons of water in the tank, $7\frac{3}{4}$ tons. It has Benson's water tube boiler, with a donkey pump for maintaining an artificial circulation of the water between the external water casing and the water tubes. The steam is worked through a pair of 6-in. upright cylinders with 12-in. stroke, which can be geared at pleasure to drive either or both driving wheels (5ft. in diameter), and at a speed of fourteen miles an hour, although for a short run a rate of nearly eighteen miles an hour has been attained. The wheels are driven through a pitch chain, and simple means are provided for compensating for its gradual wear. The driving axles, one to each wheel, are hung each on two easy springs, and instead of axle guards, radius rods are employed to connect them with and secure them to the framing. A single steering wheel in front permits of turning the engine within a circle 12ft. in diameter, and nearly as quickly as a good mounted rider could turn a horse. Nothing, indeed, can exceed the ease with which the engine is controlled in all its movements. On the engine shaft there is a pulley and windlass, the former for driving machinery, if required, and the latter for hoisting, for which purpose, we believe, Messrs. Mare will employ the engine to a large extent. For the purposes of a fire-engine two of Mr. Roberts' double-action pumps, each $9\frac{1}{2}$ in. in diameter, and filling for a length of 7in. at each revolution, are provided. The boiler is purposely made to hold a rather large quantity of water, and the time occupied in raising steam from cold water was considerable. On getting to work, however, a $1\frac{1}{2}$ in. jet was thrown to the top of a chimney 140ft. high, and afterwards to a horizontal distance of 182ft., not measuring the broken water and spray, which reached 10ft. or 15ft. further. The steam was not maintained at a uniform pressure—indeed, it was at one time as high as 170lb. on the square inch, and, again, very little could be found. In this respect, however, Mr. Roberts hopes to be able to make an improvement before the engine is fairly put to work. During the trial he showed how, while the pumps were making 50 double strokes per minute, he could play through a nozzle less than one thirty-second of an inch in diameter; and other nozzles respectively three-sixteenths of an inch, $\frac{1}{2}$ in., $\frac{3}{4}$ in., 1 in., and $1\frac{1}{2}$ in. were successfully used. The engine returned to Millwall at a late hour, without accident.

SOUTH STAFFORDSHIRE EDUCATIONAL ASSOCIATION.

The third annual meeting of the South Staffordshire Association for the promotion of adult education and evening schools, took place in Wolverhampton, on Tuesday, September 23, under the presidency of the Right Hon. Lord Lyttelton. At two o'clock the general meeting was held in the Athenæum rooms, Queen-street, for the transaction of the ordinary business of the association. Among those present, in addition to the noble Chairman, were Harry Chester, Esq., Vice-President of the Society of Arts; the Hon. and Rev. S. Best, of the Southern Counties Adult Education Society; J. Slaney Pakington, Esq., President of the Worcestershire Union of Educational Institutions; Barnett Blake, Esq., of the Yorkshire Union of Institutes; the Revs. J. P. Norris, and R. H. Sandford, H.M. Inspectors of Schools; J. E. Beasley, Esq., of Bloxwich; the Revs. H. F. Newbolt, of St. Mary's, Bilston; J. W. Grier, of Stourbridge; J. H. Thompson, of Cradley; J. H. Iles, T. H. Campbell, and J. Richardson, of this town; T. Slater, of Sedgley; and W. Stephens, of Wednesfield; Professor Beckett, Mr. H. H. Fowler, Mr. J. N. Langley, Mr. A. W. Wills, Mr.

F. Talbot, of Spon Lane; Mr. Crabtree, Gold's Hill, and the representatives of the various institutions in union with the association.

Lord LYTTELTON, without making any opening speech, at once called upon

Mr. JONES, the Secretary, to read the report of the committee. It stated that last year there were apprehensions lest, through lack of that general support from the employers of labour in the district which they originally anticipated, and from the want of co-operation on the part of many Institutions in the locality, they should be compelled to modify their plans very considerably; but the increasing interest which had been manifested towards the Society had enabled the committee to extend their plans since that time, and they had no doubt that as the beneficial operations of the Society became more generally known, they should receive a corresponding amount of support from the district. Ten additional Institutions and fifteen night schools have been provisionally received into union during the year, and several other societies had the matter under consideration. With very few exceptions all the important Institutions in the district for secondary education were now connected with the Association. At one of the meetings of the executive committee, Mr. Talbot tendered his resignation of the office of hon. secretary, and the committee recorded their sense of the disinterestedness and ability with which he had discharged his duties, added his name to the committee, and appointed Mr. Jones to the office of secretary, together with that of agent. At another meeting it was decided to fix the fees for the Society's lectures at 10s. 6d., the Association to defray the travelling expenses of the lecturers. The general examinations in connexion with the Association were held in March. 157 candidates from different night schools and evening classes were examined, and out of these 91 gained certificates. The final examinations of the Society of Arts were held in May, and fifty-one candidates were successful; seven prizes of the aggregate value of £25 were gained by them. The increase in the number of candidates examined had been satisfactory since the Society was established. The committee hoped that another year the examinations of students in science classes, under the Government department of science and art, would be held under the direction of the Association. A considerable number of professional lecturers on the Society of Arts list had consented to lecture at reduced rates at Institutions in union provided four or five consecutive engagements could be secured. Many gentlemen in the locality had also promised lectures; associated Institutions could thus obtain good lectures at 10s. 6d. each. As regarded finances, the Committee stated that they had been able to carry on successfully the work of the Society, and at the same time to reduce the balance due to the treasurer at the last annual meeting. They required about £200 per annum, and had at present only a reliable income of from £130 to £140; hence they depended in no slight degree upon donations. They had directed the secretary to bring the operations of the Society under the notice of the employers of labour, and to solicit them to become subscribers. The organising agent had superintended evening classes by regular weekly attendance at nine Institutions and evening schools, making 285 visits of one or two hours' duration. He had also delivered four lectures, and attended 20 public meetings for the purpose of explaining the operations of the Society. He had visited 14 night schools and examined 150 candidates in reading, besides which he had transacted much of the ordinary business of the Association. The Committee hoped that next year the number of candidates for examination from night schools might be increased, and expressed their continued appreciation of the examination scheme of the Society of Arts. The report then referred to the recent Educational Conference at Dudley, and stated that the Committee had resolved to print an abstract of the papers read on that occasion. It was their intention to hold a similar conference annually. In conclusion, they said they

had no doubt that another year would witness far greater extension of the plans of the Society than had been the case in any previous year since its establishment.

The night-school visitors reported that they had visited twenty night schools, having 925 scholars and 58 teachers. The report, after speaking favourably of the schools, lamented the smallness of their proportion in relation to the population. Thus, while the population of South Staffordshire was 220,000, the number of scholars in attendance upon night schools was but 638, or about 1 in 300, and in many districts there was no night school at all. In Wolverhampton, with a population of 50,000, the average attendance upon the night schools was but 60, while in Walsall, with a population of 21,000, it was only 40. The night school examiners reported that they had examined 156 candidates of 21 different schools, which was more than double the number at the examination of the previous year. Twenty-nine obtained first, and sixty-one second class certificates. The organizing master reported that the general condition of the Institutions appeared to be improved, and several had found it necessary to provide themselves with more commodious premises. He recommended to managers the consideration of providing suitable amusement for members, rather than to seek to make matters scientific and educational humorously attractive. He pointed out the great want of teachers both for Institutions and night schools, and the great superiority of paid ones over gratuitous labour, suggesting that some means should be taken to retain the services of successful candidates for the Society of Arts certificates as teachers. An animated discussion ensued upon this portion of the report, and the general opinion seemed to be that a combination of paid and unpaid agency would best meet the difficulties that lay in the way of providing teachers, while the suggestion as to successful students was generally approved.

Mr. H. CHESTER, speaking of the association, said it appeared to him generally to be based upon a very excellent foundation, and to be admirably worked, while its full importance would disclose itself in a short time. The whole was so compact and so necessary, that he should be sorry to see any stone struck out of the edifice, and counselled them above all things to preserve the organising agency, which was a very valuable feature of the Institution. All they stood in need of was a little pecuniary help, which, as the benefits springing from the Institution developed themselves, would no doubt be forthcoming from the employers of labour. He trusted soon to find, not only all the men, but all the women, taking advantage of the examinations for the certificates and prizes of the Society of Arts; for he was happy to tell them that this year a young female candidate at Birmingham had taken the first prize in English literature against all England. The examiner said that her papers were most admirable, and those on Shakspeare some of the best he ever read.

The financial statement was then read, and showed that the receipts had been £170 10s. 3d., and the payments £147 18s. 11d. Some expenses, however, were owing, and some subscriptions were due. The balance against the Society at the last meeting had been reduced from £56 8s. 4d. to £31 5s. 10d.

Some formal business was then disposed of. West Bromwich was selected as the place of meeting for next year, and votes of thanks were passed to the noble President, to the lecturers of last year, the examiners, the treasurers, the local Board, and others, and the proceedings were adjourned.

THE DINNER.

At 4 p.m. the members and their friends dined together at the Swan Hotel, the Mayor, G. L. Underhill, Esq., occupying the chair, and the Rev. J. H. Iles, rector of Wolverhampton, taking the vice-chair. At half-past 5 the successful candidates assembled in the Athenæum

Rooms, where tea was provided for them, and many of the clergy and friends of the candidates attended.

PUBLIC MEETING IN THE CORN EXCHANGE.

At 7 o'clock a public meeting was held in the Corn Exchange, which was very numerous attended. In addition to the gentlemen mentioned as attending the morning meeting, the following were present:—The Mayor of Wolverhampton, Rev. J. Hampton, Messrs. J. Hartley, C. B. Mander, George Thompson, W. M. Fuller, W. J. Brevitt, W. Fleeming, F. Fellows, &c.

Lord LYTTLETON, in addressing the meeting, alluded to the absence of Sir J. Kay Shuttleworth, who had promised to attend, stating that it had arisen through a misunderstanding, but they could hardly wonder at his not being present when they knew that he was engaged almost day and night in his duties as chairman of the committee for the relief of the great distress in Lancashire. His Lordship went on to say that although the distress had been so severe in the cotton districts, and although the effects of the civil war in America had been felt in this district, still this had not impeded the work of the Association, which had increased prosperously. Of this his lordship proceeded to give instances, drawn from the reports, stating also the changes which the Committee had made during the year. They could take very little credit for the progress of the Association; all the credit he could claim for them was that at no time, even when there was some little doubt about its success, did they despair of its progress or ultimate success. Lord Lyttelton called attention to the desire of the Association to spread a knowledge of drawing and science among the population of this district, by means of the classes that were being established in connection with the Government Department of Science and Art, and said if they could succeed they would be giving to the operations of the Association a completeness which had not been attempted before. He expressed a hope that some of the speeches that were to follow would have reference to the future lives of those persons who had taken prizes and certificates, and hoped that every successful candidate would feel the responsibility cast upon him by the distinction he had thus acquired. He trusted also that they would feel it a pleasure, a pride, and a duty, to apply what they had learned not to their own advantage solely, but to encouraging and developing the ability of others. With regard to the effects of the education they were endeavouring to spread, he said they rather looked to future generations for them to show themselves; but yet there was no doubt that the fruits of their labours were apparent around them. As a remarkable instance of the moral improvement that was going on, his lordship mentioned that in Gloucestershire there were seven gaols, and, notwithstanding the increase of population that had taken place, six of them were now shut up, one answering the full wants of the county. In conclusion, his lordship said that the diminution of crime might be due to many causes, but it could not be denied that education had had a great share in that improvement.

The Hon. and Rev. Mr. BEST then moved, "That the past experience of Unions of Educational Institutions prove them to be well adapted for the promotion of secondary education, and that the South Staffordshire Association is fully deserving of the warmest support." He thought that the concerns of the Union had been carried on in a most business-like and practical manner. If other than pecuniary support were not given to the association its object would not be successfully accomplished. He thought that this Institution had filled up a gap which had long existed between the time when a boy left school and the time at which he was competent to pass the examinations of the Society of Arts. If the question was asked, "How is education promoted by this Union?" the answer would be, "By examinations." The certificates given at these examinations were very effectual in favourably influencing employers in the immediate district, but their efficiency would be greatly augmented if a more

central value were given to them. This had been done in several unions, and it was desirable that such should be the case in this one. Finally, he expressed a hope that the South Staffordshire Association would go on prosperously in its career of usefulness.

Mr. J. SLANEY PAKINGTON expressed the pleasure he felt in attending the proceedings of the anniversary; and he hoped the gentlemen who were present would derive some little gratification on a future day from a return visit to an anniversary of the Worcestershire Union of Institutions. He pointed to the admirable manner in which the unemployed in Lancashire were bearing their distress, as in some way owing to the benefits which had been produced by mechanics' institutions. On account of what Sir James K. Shuttleworth could have told the meeting of the proceedings of the institution in Lancashire, he regretted greatly the absence of that gentleman. Whilst many mechanics' institutes had failed in many cases, in others less noted they had succeeded; and in Worcestershire success was eminently following the combination of the institutions in that county. The resolution he had to speak to was, "That the experience of the unions of the Mechanics' Institutes proved them to be well adapted for secondary education." It was this secondary education which was so marked an element in the education of many men who had made themselves eminently conspicuous in the history of this country, and which composed a conspicuous feature in the education of the people of England; and it was the union of institutions especially designed for the promotion of secondary education in localities which was calculated greatly to increase the usefulness of the individual institutions. The South Staffordshire Association was too well known for its usefulness to make it necessary for him to advocate it; but he would, in conclusion, say that, by the influence of the unions, the different institutions would be placed high among the strongest bulwarks of the state.

The successful candidates who had been awarded certificates were then called up to the platform, and they received their certificates from the hands of the noble chairman amid the plaudits of the audience. The successful candidates from the night schools having received their awards,

The Rev. J. P. NORRIS congratulated the prize takers on their success. He had no longer, he said, to advocate the desirability of education. In June it was his pleasure to labour in Lancashire. Whilst there, he saw 170 operatives accompany Sir James Kay Shuttleworth to tea, at which they all sat down together. There was not one of those operatives who did not understand the cause of their distress as well as Sir James and himself understood it. He asked Mr. David Chadwick to what the wonderful change (as compared with 1840, for instance), in the conduct of the operatives under somewhat similar circumstances was to be attributed? Mr. Chadwick traced it to the educational clauses of the Factories Act of 1843-4. Under the highly salutary influences of the working of those clauses the present generation of artisans had grown up, and hence the conspicuous difference in their conduct. The rev. gentleman then delivered some excellent advice to the students. The noble chairman next distributed various money prizes to the successful after prize candidates of the iron and coal masters' prize scheme association.

Mr. HARRY CHESTER then proposed a resolution which pointed to the success of the Examinations of the Society of Arts as an evidence of the value of the assistance of that Society. He said he was for some years one of the officers of the Council of Education. The result of that experience satisfied him after the Exhibition of 1851 that the great object to be sought with a view to promote the education of the country was to obtain the modes and means of extending the education of adults—the master-key of the whole question of education. He said that he had come a great distance to congratulate the members and friends of the South Staffordshire Society. Great as were the usefulness and success of the great so-

cieties elsewhere, he believed that there was not elsewhere a society of more value than the one whose interests were now before them. In South Staffordshire they had exactly the right Institution to produce the results desired. He was literally surprised to see the great success which had attended the society during the very brief period of its existence. Mr. Chester, at some length, explained the plan and mode of operation of the Society of Arts examination, and pointed the value of the prizes and certificates given by the society. He mentioned that the student who had taken the prize that was offered by his late Royal Highness Prince Albert for the student who obtained the greatest number of prizes and first-class certificates during three consecutive examinations was a young man in a woolstapler's warehouse in Bradford, and a member of its Mechanics' Institute. His name had since been sent in by the society to Lord Granville with the view of his obtaining an appointment in a public office. In conclusion, Mr. Chester advised the association never to part with their president, nor with their organising agent, for such an officer was the backbone of their Institution.

The Rev. G. C. CAMPBELL seconded the motion, and noticed as one good effect of the examinations that those students of the Working Men's College who obtained certificates became anxious to act as teachers to others.

The CHAIRMAN having distributed the prizes and certificates of the Society of Arts to the successful candidates amid general applause,

Mr. BLAKE, from Yorkshire, then moved that the extension of a sound and healthy education was among the most urgent claims of the times, and urged upon the employers of labour their duty to support the objects of the Association. They had found the operations of the Yorkshire Union productive of much good; and hence he most heartily commended the South Staffordshire Association, which seemed to possess many advantageous features over other Unions of Institutions, to the people of the district. He felt sure another year they should have to congratulate the Association on increased usefulness and success.

The Rev. J. HAMPTON seconded the resolution, and announced his intention of immediately commencing night classes in his parish (St. John's, Wolverhampton).

After a vote of thanks to Lord LYTTLETON, on the motion of Mr. G. L. UNDERBILL, the Mayor, the proceedings terminated.

(As the meeting of the Association was held under the auspices of several Institutions in the town, it had been arranged for the secretaries to read short abstracts of the last year's work of the Societies; but there was not sufficient time for the purpose. The reports, however, set forth very clearly that the leading Institutions in the town were doing their work successfully. The Working Men's College has had an average attendance of 65 students during the year, and more commodious premises have been taken for the Society. Science classes are about to be established here. Altogether, the College is in a most prosperous condition. The Young Men's Christian Institute have carried on extensive class operations during the year, and have considerably increased their number of successful candidates at the last Society of Arts' Examination. Their report alludes to the assistance which the Society has derived from the South Staffordshire Educational Association.)

Proceedings of Institutions.

FARNHAM YOUNG MEN'S ASSOCIATION.—After nine years of continuously increasing prosperity the Committee of the Farnham Young Men's Association lay the third triennial report before the members and lady subscribers. They feel they can confidently appeal to such report as showing the advance the Association is making towards

the accomplishment of those objects for which it was established; and they can appeal to the public at large to testify the good the Association is doing among the young men of Farnham. The committee feel that the library is one of the most important agents for good in the constitution of the society, and it has been their constant endeavour to place upon its shelves only such books as are of an unexceptionable moral tendency, as well as instructive and amusing. The cost of many expensive works of reference, which were purchased during the year 1861, caused a deficiency on the balance sheet of that year, and in consequence not quite so many books as usual have been purchased during the present year. The cost of binding has now become a heavy demand upon the limited sum available for the purchase of books, and the committee earnestly press upon the members the importance of taking care of the books whilst in their possession—much more injury being done to the volumes in many instances than can be at all justifiable. The library now numbers 1509 volumes, an increase of 571 volumes since the publication of the last report. The money expended on the library during the three years ending September 1st, 1862, has been £138 1s. 9d., or an annual average of £46 0s. 7d., the average of the three previous years being just under £49. The various branches of expenditure were: for books, £89 0s. 5d.; periodicals, £19 15s. 8d.; binding, £14 8s. 8d.; and for library incidentals, £14 17s., which includes £7, the cost of printing the last library catalogue in July, 1860. The issue of books for home reading has been rapidly increasing. Between October 1st, 1858 and October 1st, 1861 (the returns being made up and reported at the commencement of each lecture session), no fewer than 10,578 volumes were issued to the members, and 2,626 monthly parts of periodicals. Taking the average number of members during these three years to be 280, of whom only about one-half avail themselves of the library, this would give about 25 volumes and 10 monthly parts of periodicals a year to each reader. The committee are confident, from the reports of the sub-librarians, that when the returns are made up for the present year, a still further increase will be shown. With these statistics before them (considering that only one volume at a time can be issued to any reader) are not the committee justified in their opinion that no library could be more fully appreciated? The reading room is now supplied with the following papers and periodicals—Papers: Times, Standard, and Evening Star, daily; County Chronicle, Gardener's Chronicle, Illustrated London News, Surrey and Hants News, Sussex Express, Punch, and West Surrey Times, weekly, together with many occasional papers supplied by friends. Periodicals: Art Journal, Athenaeum, All the Year Round, Blackwood, British Messenger, British Workman, Cornhill (2 copies), Chambers's Journal, Every Boy's Magazine, Fraser, Good Words, Leisure Hour, Macmillan (2 copies), Mechanics' Magazine, Nichols's Register, Once a Week, Quarterly Review, Society of Arts' Journal, St. James's Magazine, Sunday at Home, and Temple Bar. The museum of natural history, geology, numismatics, and objects of general interest, has entirely outgrown the space available for it in the present reading room. The Committee hope that more space may become available on some future day, and they beg to offer their best thanks to all those who have contributed objects of interest to the collection, and to Mr. R. O. Clark, the curator, under whose sole management it is, for the time and trouble he must have devoted to it. The expenses of the museum are not charged upon the general funds of the Association, but are paid by the curator with money specially collected by him for that purpose. The following lectures and elocutionary entertainments have been delivered during the last three sessions:—1859-60—Three Weeks in Ireland, Rev. G. H. Sumner; Insect Life (2nd lecture), Rev. T. G. Clarke; Reading Aloud, Rev. T. G. Hatchard; Birds, Rev. W. H. Hawker; The Genius of Wordsworth, Dr. Lane; Mineralogy, with notes and

sketches taken during a balloon excursion, E. Vivian, Esq.; The Arctic Regions, Rev. T. G. P. Hough; two lectures—Recollections of the Peninsular Campaigns, Rev. A. B. C. Dallas; two lectures—The Microscope, Rev. John Bacon; Things above the Earth, Rev. S. Mayhew; Earthquakes, Rev. Thomas Bacon; the members of the Elocution and Discussion Section gave two entertainments during the session, and three open nights. 1860-61:—The Glaciers of the Alps, Rev. E. L. Berthon; Things on the Earth, Rev. S. Mayhew; Water Power, Rev. G. T. Hoare; A Visit to the General Post Office, Rev. T. G. Hatchard; A Visit round Oxford, Rev. F. Trench; Modern Discoveries in Central Africa, Rev. E. D. Wickham; two lectures—The Air we Breathe—its Chemistry, Mr. R. Lidgate; Locomotion, Rev. John Bacon; A Visit to the Holy Land, Rev. C. T. Mayo; Tour in Brittany and the North-West of France, Rev. C. A. Seymour; The Poetry and Poets of Germany, Rev. W. L. Blackley; the members of the Elocution and Discussion Section gave three entertainments during the session. 1861-62:—The Incentives to Studious Pursuits, Rev. Mark Cooper; Geology in relation to Scripture, Rev. J. S. Hoare; The Instruction of the Deaf and Dumb, W. Sleight, Esq.; Things on the Earth, Rev. S. Mayhew; Volcanoes, Rev. Thomas Bacon; Wolvesey and its Historical Associations, Rev. Charles Collier; China, Rev. Hugh Huleatt; The Huguenots, Rev. Thomas Marzials; Ancient and Modern Egypt, Rev. C. T. Mayo; The Physical Geography of England, Rev. W. Brodie; the members of the Elocution Section—one entertainment; the members of the Aldershot Institution—one entertainment. During the last two sessions a register was kept of the numbers attending each lecture. In the session of 1860-61, 2,922 persons attended the fifteen meetings, and in that of 1861-62, 2,703 attended the twelve meetings. The receipts and expenditure of the last three sessions have been as follows:—Receipts, £69 18s. 6d.; Expenditure, £68 18s. 6d. The issue of tickets, at 3d. each, for the admission of the labouring classes continues to increase. The committee again acknowledge with thanks the kindness of the Lord President of the Association, in using his powerful influence to obtain so many lectures without any material expense to the Association, and more particularly for the great interest he manifests in the welfare of the Association. The Committee also thank the Ven. Archdeacon Utterton, Vice-President, for the interest he invariably takes in the well-being of the society; and they feel that their warmest acknowledgments are due to those gentlemen who have kindly come to deliver lectures, and also to all the elected officers for the zeal with which they have fulfilled the onerous duties of their respective offices. The state of the funds has varied during the last three years, owing to several causes, and especially that in 1861 no "donations" were received at all equal to those received in 1859 and 1860. The balance sheets from 1859 to 1861 give the following totals—the accounts being made up to the end of December in each year:—1859—Receipts, £103 1s. 4d.; expenditure, £96 11s. 1860—receipts, £141 16s. 1d.; expenditure, £134 14s. 9d. 1861—receipts, £125 15s. 7d.; expenditure, £131 19s. 4d. The Association now numbers 37 honorary members, 126 ordinary members, and 101 lady subscribers.

LONG PRESTON MECHANICS' INSTITUTION.—This place, although an agricultural village, in Craven, containing little more than 500 inhabitants, may boast of having one of the best Institutions in the kingdom in proportion to its population. The building was erected last year, at a cost of about £800, the whole of which was contributed in the neighbourhood; and notwithstanding the Institute was founded ten years since, the first *soirée* was held on Friday last, the 5th September. Mr. John Thompson, who has been indefatigable in his support of the Institute since its commencement, was in the chair, and in his opening address pointed out the many advantages afforded to the locality. They had a library of above 850 volumes, with which two branches for village circulation were con-

nected, a really handsome reading-room supplied with newspapers and magazines, evening classes for elementary well filled by persons of all classes, and the meeting instruction and occasional lectures. The large room was addressed by the Rev. Adam Clarke (a grandson of the celebrated Dr. Adam Clarke), Mr. Barnett Blake, the agent of the Yorkshire Union of Mechanics' Institutes, and other gentlemen, the proceedings being enlivened by the musical exertions of a very efficient choir.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, September 19th, 1862.]

- Dated 12th June, 1862.*
1426. C. J. Neale, High Oakham, Nottinghamshire—Imp. in apparatus for measuring and registering corn and other grain.
- Dated 20th June, 1862.*
1816. J. B. T. Detuncoq, Quesnoy le Montant, Somme, France—Improved apparatus or machinery for treating flax or hemp.
- Dated 21st June, 1862.*
1835. H. Gonnon, St Nazaire, Loire Inferieure, France—Improved machinery for making bricks.
- Dated 26th June, 1862.*
1878. J. Martin, Rue de Bordeaux, Perigueux, France—Imp. in reaping and mowing machines.
- Dated 21st July, 1862.*
2071. W. E. Gedge, 11, Wellington-street, Strand—Improved excavating or boring apparatus. (A com.)
- Dated 28th July, 1862.*
2129. C. W. Eddy, 8, Warwick-terrace, Belgrave-road, Hanover-square—Imp. in the means of impeding the entrance of ships and vessels, and in particular of screw ships, into channels.
- Dated 29th July, 1862.*
2146. J. Mackenzie, Arundel-square, Islington—Imp. in shaping machines for curvilinear surfaces.
- Dated 31st August, 1862.*
2183. R. Nurse, Machen, near Newport, and D. Nurse, Jun., Ponty-mister, Monmouthshire—An improved annealing pot.
2185. C. H. Plevins, Dunstan-hall, Derbyshire, and H. Rider, Rotherham—Yorkshire—Imp. in the construction of colliery wagons, tubs, or corves, and in apparatus for tipping or discharging the same.
- Dated 5th August, 1862.*
2197. J. Higgin, Manchester—An improved substitute for cow dung used in printing and dyeing textile fabrics or yarns.
- Dated 17th August, 1862.*
2212. F. H. M. C. D. C. De Fenis de Facombe, Paris—Imp. in the means of lighting towns or other localities, and of ventilating, warming, and providing the same with water.
- Dated 9th August, 1862.*
2232. J. J. H. Gebhardt, Lawrence-lane—An improved fastening for purses, pocket books, needle books, ladies' companions, instrument cases, and other similar articles. (A com.)
- Dated 18th August, 1862.*
2317. J. Briere, Brussels—A continuous self-acting condenser, being a new boiler-feeding apparatus.
- Dated 26th August, 1862.*
2327. W. Whittle, Smethwick, Staffordshire—Improved machinery for the manufacture of nails and spikes.
2329. H. Whittaker, Church, near Accrington, Lancashire—Imp. in hedges or hedges, and in the manufacture of the same.
- Dated 23rd August, 1862.*
2354. J. Edwards, 77, Aldermanbury—Imp. in the permanent way of railways.
- Dated 26th August, 1862.*
2362. H. R. Hughes, 31, Mottram-street, Stephen-street, Salford, Manchester—Imp. in the construction of sawing machines.
2363. W. E. Gedge, 11, Wellington-street, Strand—Imp. in stays or corsets. (A com.)
2364. J. Harrison and B. Harrison, Otley, Yorkshire—Imp. in clod crushers.
2367. L. Jarosson, La Madeleine, near Lille, France—An improved process and machinery for bleaching or washing textile fabrics and materials.
- Dated 27th August, 1862.*
2375. W. H. Turner, Blackburn—Imp. in machinery or apparatus for carding cotton and other fibrous materials.
2376. W. Clark, 361, City-road—Imp. in tea and other trays for the table, and in urns and apparatus intended to be used therewith.
2377. G. Lindsay, Belfast—An improved mode of arranging and disposing guns in ships employed in naval warfare and otherwise.

2379. R. A. Brooman, 166, Fleet-street—Imp. in machinery for separating or sorting and washing coal and other minerals. (A com.)

2381. J. G. Nutting, Regent-street, Westminster—An imp. in the manufacture of buttons.

2383. H. W. Cook, Norwood, Surrey—Improved apparatus for obtaining motive power, applicable for driving machinery or for other purposes where a motive power is required.

Dated 28th August, 1862.

2385. J. Kitchin, Liverpool—Imp. in ventilators.

2389. J. J. Moeckel, Rouen—Imp. in machinery or apparatus for spinning cotton, wool, and other fibrous materials.

2391. W. Husband, Hayle, Cornwall—Imp. in water valves.

2393. C. Humfrey, Suffolk-grove, Southwark—Imp. in the treatment of petroleum to render it non-inflammable.

Dated 29th August, 1862.

2395. H. Jones, Birmingham—Imp. in breech-loading fire-arms.

2397. W. Smith, 19, Salisbury-street, Adelphi—Imp. in the construction of furnaces. (A com.)

2399. H. Harben, Oxford-villa, Haverstock-hill—Imp. in the manufacture of cotton, cotton fibre, and other similar fibrous productions.

2403. R. Courtenay, Craigton, Kingston, Jamaica—Imp. in obtaining motive power.

2405. E. A. Pontifex, Shoe-lane—Imp. in steam traps, or apparatus for facilitating the escape of condensed steam.

Dated 30th August, 1862.

2407. E. C. Harding and C. Doody, Manchester—Imp. in braces.

2411. J. Meyer, Kennington, Surrey—Imp. in mechanism for the production of Jacquard cards, and in the said cards or card bands.

Dated 1st September, 1862.

2413. J. Nickson and T. Waddington, jun., Manchester—An improved foundation or groundwork for plaster for ceilings, walls, partitions, and other purposes.

2415. W. E. Gedge, 11, Wellington-street, Strand—Imp. in apparatus for washing the felts of paper making machines. (A com.)

2417. J. Whitehead, Newton Moor, Cheshire—Imp. in machinery or apparatus for preparing, spinning, and doubling cotton, wool, and other fibrous materials.

2421. W. Clark, 53, Chancery-lane—Imp. in the means of obtaining light and heat, and in apparatus for the same. (A com.)

2423. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for regulating or controlling the working of motive power engines, applicable also to the regulation of the flow of liquid, air, or gas through pipes or conduits. (A com.)

Dated 2nd September, 1862.

2429. R. Waygood, Newington, Surrey—Imp. in steam boilers.

2431. J. B. Thompson, Moreton-place, St. George's square—Imp. in electro-magnetic machines.

2432. Sir W. O. Brooke, Euston-place—Imp. in the construction of submarine telegraphic cables.

2433. A. Johnston, 49, Arlington-street, Woodland-road, Glasgow—Imp. in machinery for pressing cotton and other materials, and in bands for retaining the same in bales.

Dated 3rd September, 1862.

2435. H. Elliott, Birmingham—A new or improved instrument or apparatus for extracting the cases of pin cartridges from breech loading fire arms, and for recapping, recharging, and closing or turning in the said cartridge cases.

2437. C. Walton, Bradford—Imp. in circular box looms.

2439. W. Clark, 53, Chancery-lane—Imp. in musical instruments. (A com.)

2441. R. A. Brooman, 166, Fleet-street—Imp. in tools for boring, and in apparatus for working the same. (A com.)

2442. R. A. Brooman, 166, Fleet-street—Imp. in apparatus for transmitting electric telegraph messages and signals. (A com.)

2443. P. J. Bossard, Kennington-road, Surrey—Imp. in stoppers for bottles, jars, guns, tubes, and other open mouthed articles, in taps, and in fixing them in casks and other vessels. (A com.)

Dated 4th September, 1862.

2445. B. F. Cowan, Victoria Hotel, Euston-square—Imp. in cannon and other fire-arms.

2449. R. P. Coles, Englefield-road, Islington—Imp. in the construction of the permanent way of railways.

Dated 5th September, 1862.

2451. W. Slater, Little Bolton, and W. R. Harris, Salford, Lancashire—Imp. in self-stripping carding engines for preparing cotton and other fibrous substances or materials.

2453. H. W. Hart, Fleet-street—Imp. in argand and other burners.

2454. D. A. Samuel, Belvedere, Kent—Imp. in apparatus for steering vessels.

2455. J. S. Margetson, Cheapside—Imp. in the manufacture of the material intended for scarfs or cravats, and in the machinery employed therein.

2456. W. Wells, Ryder's-court, Leicester-square—Imp. in horse shoes, and in the method of fastening the same.

2457. W. E. Newton, 66, Chancery-lane—Imp. in lamps. (A com.)

2458. S. H. Hadley, City Mills, Upper Thames-street—An improved process for manufacturing gas for illumination.

2459. J. R. Johnson, Stanbrook-cottage, Hammersmith, and J. A. Harrison, 25, St. Andrew's-road, Southwark—Imp. in apparatus for taking photographic panoramic pictures.

Dated 6th September, 1862.

2460. S. H. Huntly, 50, Upper Baker-street, Regent's-park—Imp. in cooking apparatus more particularly applicable to the requirements of the army and navy.

2461. J. Snider, jun., 51, Dorset-street—A new and useful method of increasing the durability of, and for preserving, cloths and other like fabrics used for sails, tarpaulins, tents, and other coverings; also all kinds of ropes, and cables, and telegraph wires; also all woods, metals, and other materials used in buildings or constructions on land or on water; and all objects exposed to the action of acids, alkalis, gases, fire, fresh or salt water, atmospheric or other like destructive influences by the application of graphite.

2462. S. Pudney, 37, Manor-street, Clapham—Imp. in apparatus to be used in the manufacture of sulphuric acid.

2463. H. Hughes, Homerton—An improved fritted and fluted fabric or material, and imp. in fluting or goffing machines.

2464. E. L. Duncan, Inverness-road, Bayswater—Imp. in the manufacture of splints.

2465. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in fire-arms and projectiles. (A com.)

2466. W. J. Curtis, Tufnell park-road, Holloway—An improved construction of breech-loading cannon.

Dated 8th September, 1862.

2468. C. W. Williams, Lancaster—Imp. in steam boilers.

2469. F. D. Artington, Manchester—Imp. in balances.

2470. J. S. Crosland, Ashton-under-Lyne—Imp. in the manufacture of tubes made of copper, and of copper combined with other metals.

2475. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in railway signals. (A com.)

2476. A. J. Alderman, 59, Guildford-street, Bloomsbury—Imp. in ships' windlasses, capstans, and cable stoppers, applicable generally to hauling and working with chains.

Dated 9th September, 1862.

2477. J. Webster, 142, Woodbridge road, Ipswich—Imp. in preventing the incrustation of steam boilers.

2478. Lieut. P. Rainier, R.N., The Cedars, Shirley, near Southampton—Imp. in watches, chronometers, and other timekeepers.

2479. J. Maurice, 3, Langham-place, Regent-street—Imp. in the construction and preservation of ships and vessels.

2480. F. Selby, Surbiton, Surrey—Imp. in traction engines and in valves for traction engines where compound engines are used, which latter imps. are applicable to compound engines generally.

PATENTS SEALED.

[From Gazette, September 19th, 1862.]

September 19th.

767. R. A. Brooman.	822. A. Fryer.
768. R. A. Brooman.	824. T. Guibal.
769. R. A. Brooman.	828. W. Clissold.
770. R. A. Brooman.	830. L. De la Peyrouse.
775. A. Hill.	833. J. Parker.
777. E. Smith.	835. H. Nunn.
778. E. Field.	875. I. Morris.
783. R. Kay.	880. W. Paterson.
785. J. Newall.	899. L. B. Schmolle.
786. J. M. Hart & R. Lavender.	903. W. Clark.
787. J. Fawcett.	923. G. Holcroft.
788. J. Humphrys.	950. H. T. Hassall and M. Burke.
789. B. H. Mathew.	952. J. C. Kay and W. Hartley.
793. D. Abercrombie.	966. W. E. Newton.
795. T. Fontenay.	984. E. Welch.
798. J. Davis.	988. J. Watremez and A. Kloth.
801. J. H. Tuck.	1039. H. Holland.
802. J. G. Jennings.	1074. R. A. Brooman.
805. W. Holiday.	1147. A. Parkes.
806. G. Hartshorne, jun., D. G. Ward, and W. Woolley.	1149. A. Parkes.
808. J. H. Brierley.	1244. W. T. Glidden.
813. B. Fleet.	1490. N. Ames.
814. J. Topham.	1663. J. Whitworth.
816. W. Henson.	1757. A. Longbottom.
817. J. Stewart.	1839. G. T. Bousfield.
821. W. Beaumont & J. W. Edge.	1844. H. Ponsonby.
	1967. O. W. Child.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, September 23rd, 1862.]

<i>15th September.</i>	<i>19th September.</i>
2110. T. Richardson.	2138. A. Manbre.
2113. J. Luis.	2139. W. Weild.
	2193. T. Sutton.
	2213. W. Hartley.
	2291. W. Irlam.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, September 23rd, 1862.]

<i>15th September.</i>	<i>9th September.</i>
2092. J. Lewtas.	2125. W. Politt.
2113. G. A. Biddell.	

Journal of the Society of Arts.

FRIDAY, OCTOBER 3, 1862.

INTERNATIONAL EXHIBITION OF 1862.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s. ; to other

persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

It was the intention of the Council to issue the volume complete in the early part of the present month, but as several of the Reports have not yet been received by Her Majesty's Commissioners, the completion of the entire work has been unexpectedly delayed ; the Council, however, unwilling to defer the publication of the Reports already completed, have determined to issue to the subscribers those that have been received up to the present time. When all the Reports are delivered, the parts now about to be issued to subscribers will be exchanged, if uninjured, for the perfect volume, bound or unbound, as desired.

CONVERSAZIONE.

The third Conversazione of the present season will take place at the South Kensington Museum on Wednesday evening next, the 8th of October. The cards of invitation have been issued.

INTERNATIONAL EXHIBITION OF 1862.—VISITS OF SCHOOLS.

The following is a continuation of the Schools reported to Her Majesty's Commissioners as having entered the Building, from 22nd to the 27th September, 1862 :—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Sept. 22	Aylesbury... ..	National	Duke of Buckingham ...	23	90
" "	Northfleet... ..	National	Mr. Bevan... ..	11	
" "	Derby	Wesleyan Sunday	Mrs. C. H. Turner	45	
" "	Wandsworth	Patriotic Fund (Pupil Teachers) ...	Lord Colchester	6	
" 23	Baldock, Herts ...	Sunday	G. Johnston, Esq.	38	298
" "	St. Peter's, Pimlico ...	National	Rev. Thos. Fuller	52	
" "	Royston (Herts) ...	National	Subscription	59	
" "	New Cross	Royal Naval	The Council'	63	
" "	Crayford (Kent)... ..	National	C. Swaisland, Esq.	57	
" "	Bedford	Sir Wm. Harper's	John Howard, Esq. (Mayor) ...	15	
" "	Baldwin's-gardens ...	St. Alban's Church Choir	Rev. A. H. McKonochie... ..	9	
" 24	Winkfield, Berks ...	Free	Subscription	22	337
" "	Blandford-square ...	St. Edward's	Rev. E. Stoner... ..	38	
" "	Blandford-square ...	Convent... ..	Sisters of Mercy	42	
" "	Chiddingtong, Kent ...	Adult Night	Rector and Squires	62	
" "	Coventry	Baylies Charity	The Trustees	20	
" "	Rotherhithe	National	Sir Wm. and Lady Gomm ...	86	
" "	City of London... ..	Aldersgate Ward	Rev. W. C. F. Webber	20	
" "	Watford (Herts) ...	British	Subscription	47	
" 25	Finchley	National	Rev. S. R. White	31	
" "	South End, Lewisham ...	National	Rev. S. E. F. Forster	24	
" "	St. Saviour's, Chelsea ...	National	Mr. and Mrs. McGarel	60	
" "	St. Peter's, Pimlico ...	National	Rev. Thos. Fuller	52	
" "	Paddington-green ...	Paddington	Subscription	13	
" "	Cambridge-heath ...	Hebrew	Committee... ..	60	
" "	Doctors'-commons ...	3rd City of London National ...	Dr. Kynaston	16	
" "	Tulse-hill (Surrey) ...	Grenada House... ..	E. R. Sheen, Esq.	16	

RETURN OF SCHOOLS (*Continued*).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
" "	Herts... ..	Totteridge park	R. Wilkinson, Esq.	25	433
" "	Farringdon-street ...	British	Subscription	10	
" "	Bristol	Colston's Hospital	The Trustees	126	
" 26	Chichester... ..	Teachers, Pupil Teachers..	Lord H. Lennox	39	39
" 27	St. Giles-in-the-Fields	Teachers from National ...	Rev. A. W. Thorold..	12	12

VISITS OF WORKMEN.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building from 22nd to 26th September, 1862 :—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
Sept. 22	Farm Labourers	{ Burton-on-Wolds, Leicestershire }	Edward Hallam, Esq....	24
" "	Mechanics and Labourers	Cookham Dean, Berks ...	Rev. Geo. Hodson	28
" "	17th Royal Engineers	Dover	The Officers	17
" "	Envelope Manufacturers	Upper Thames-street ...	Dudley Rolls and Co. ...	260
" "	Farm Labourers	Guildford	Messrs. Piccards and Lea ...	48
" "	7th Beds. Volr. Band	Biggleswade	Subscription	12
" "	Printers	{ "Gresham Steam Press" Bucklersbury ... }	Mr. C. Unwin	79
" 23	Garden Labourers	Redleaf, Penshurst	A. Glendening, Esq.	15
" "	Farm Labourers	Finedon, Northamptonshire	J. W. Smith, Esq.	25
" "	Farm Labourers	Finedon, Northamptonshire	W. Walker, Esq....	10
" "	Farm Labourers	Finedon, Northamptonshire	R. P. Wakefield, Esq....	15
" "	Agricultural Labourers	Lyne House, Horsham ...	Rev. J. Broadwood	30
" "	Agricultural Labourers	Slinfold, Sussex	Thomas Child, Esq.	22
" "	Agricultural Labourers	Wickham, Kent	Chas. Collard, Esq.	26
" "	"H" Division of Police	Hull	Subscription	20
" "	Agricultural Labourers	Hendbourne, Hants	Mrs. Courtney	40
" "	Timber and Slate Workers	Littlehampton, Sussex ...	J. E. Butt, Esq.	33
" "	Agricultural Labourers	Grafton Manor, Worcester.	{ Thos. Parks & H. White-hare, Esqs. }	20
" "	Agricultural Labourers	Badsey, Evesham	Rev. S. Yorke	26
" "	Agricultural Labourers	Boxgrove, Chichester ...	H. Freeland, Esq.	10
" "	Agricultural Labourers	Boxgrove, Chichester ...	Subscription	11
" "	Shoe-blacks	South London	T. G. Payne, Esq.	13
" "	Farm Labourers	Itchen Abbas	Lord and Lady Ashburton ...	50
" 24	Farm Labourers	Isham, Notts	Mr. Thos. Dicks	17
" "	Farm Labourers	{ Pitchley Grange Farm, Notts }	Mr. Ed. Dunkley... ..	16
" "	Farm Labourers	Great Harrowden, Notts ...	Mr. John Saunders	9
" "	Band of the 8th Dorset R. Volunteers... ..	Blandford, Dorset	Mr. Applin, Drum-Major ...	17
" "	Farm Labourers	Twyford, Winchester ...	Subscription	160
" "	Agricultural Labourers	Barking Creek, Essex ...	J. B. Lawes, Esq....	21
" "	Agricultural Labourers	Smeeton, Leicestershire ...	W. Paberdy, Esq....	15
" "	Agricultural Labourers	Itchen Stoke, Hants... ..	{ Lord Ashburton & Rev. C. R. Conybeare ... }	60
" "	Agricultural Labourers	Basingstoke	R. Awbery, Esq.	22
" "	Brewers	{ Walshan Le Willows, Suffolk... .. }	J. Miller, Esq.	16
" 25	Artisans and Operatives	Bristol	Individual Subscription ...	400
" "	Mechanics and Labourers	{ Eridge Castle, Tonbridge Wells ... }	Earl of Abergavenny	110
" "	Band of 4th Surrey Rifles.	Surrey	Rev. W. A. Bowyer	25
" "	Agricultural Labourers	Suffolk	J. Goodchild, Esq.	50
" "	Inmates of the London Master Bakers Alms Houses	Lea Bridge-road, Essex ...	J. Death, Esq. and Friends..	27
" 26	Mechanics and Labourers	{ Sugar Refining Works, Bristol }	Finzel Son, and Company ...	660
" "	Mechanics and Labourers	{ King-street Hall Coopersage, Bristol ... }	Messrs. Ford and Canning...	140
" "	Labourers	Chenies, Bucks... ..	Rev. Lord Wm. Russell ...	22

THE MINERAL FUEL OF ITALY.

By W. P. JERVIS, Mining Engineer, Assistant-General to the Italian Special Commissioners at the International Exhibition of 1862.

Italy, possessing as she does such vast mineral resources, it becomes an object of great importance to know whether it is desirable to smelt the ores at home or sell them to foreign capitalists. The answer to this question, which holds good for iron-works and manufactories in general, must depend upon the quantity of fuel to be obtained in Italy and neighbouring countries. Could we say positively that there were extensive deposits of coal, as in England, France, Belgium, or Prussia, it would be easy to decide upon the establishment of large works in convenient situations, and to give the necessary impulse to metallurgical operations.

As regards the use of charcoal in smelting-works, it seems to me that it would be very unwise to manufacture it on a large scale, which would involve the cutting down of the forests; the more so, since the mountainous region of Italy is so subject to violent rains, that wherever the country is stripped of trees all the soil is washed away, rendering the place quite useless for agricultural purposes, and mountain torrents are formed which swell almost instantaneously, carrying away bridges, and devastating the fertile fields towards the plains. Such is the injurious effect of cutting down all the trees that in such cases the slopes of the soft *macigno* sandstone hills become furrowed by an infinity of little watercourses, forming deep ravines with steep sides, which rapidly enlarge every winter, until at length they often attain a depth of 100 feet. The lower ground at the same time becomes exposed to the severe winter winds, the force of which is no longer broken by the shelter afforded by trees planted on the summits of the hills.

Unfortunately, it must be confessed that Italy does not possess any true coal except in the Alps and the Island of Sardinia, and even there only in very insignificant quantities. Professor Meneghini has, indeed, made the important discovery of the presence of the Coal formation in Tuscany, and given an interesting list of the fossil plants, but to the manufacturer this is of no value, for on visiting Jano (*Pisa*), the site of his investigations, I was unable to procure more than a few individual specimens of plants, almost converted into anthracite by the metamorphic agency of the neighbouring serpentine eruptions.

Tertiary lignite, on the other hand, occurs in numerous places in Italy, and is often of the best quality to be found in the world; but the basins in which it is found are very small and insignificant, so that in the course of 20 or 30 years of active working the largest of them might be worked out. This is no reason why these deposits should not be turned to account at once, and become the source of industrial speculation—on the contrary, at a future period there will be greater facilities for obtaining coal from Heraclea and other places in Asia Minor, as well as from several countries bordering on the Mediterranean, to which Italy must eventually have recourse for her fuel.

The best lignite in Central Italy is that of Montebamboli (*Grosseto*), 13 miles from the coast, and about 65 S. of Leghorn. This mine was opened in 1839, and has been rather extensively worked for many years. It furnishes black lignite of so bituminous a nature as to be difficult to distinguish from Newcastle coal, to which Prof. Cocchi considers it equal, the more so as it produces excellent coke and abundance of gaseous matter, so that it is suited for a variety of purposes, such as for metallurgical and gas works, and for steam vessels. The French Government have specified it among the varieties of coal allowed to be purchased for the Imperial Navy, and it has been employed for some years at the arsenal of Genoa, which speaks well for its calorific power and purity. M. Ponsard has within the last two years made use of this lignite with success for his new puddling furnaces at the iron works at Follonica (*Grosseto*), in the manufacture of rails, &c., but the sulphur it contains renders it unfit for smelting the iron ore.

The basin of Montebamboli is about 3 miles in circuit,

and contains two beds, one of 4 feet, below which is another of 2 feet, resting on *Alberese breccia*. They are separated by 3 ft. 4 in. of limestone containing *Dreissena Brardi*. These strata vary in inclination from 0° to 60°; they belong to the Miocene formation, as is seen by the fossil remains, such as exogenous plants, and the presence in the shales of the teeth and jaws of *Anthracotherium*, and the carapaces of tortoises.

The bituminous character of the lignite and its great similarity to coal, result from the intrusion of the serpentine or other eruptive rocks in immediate contact, so that the mineralisation of the woody matter which, under ordinary circumstances, requires a far longer period to bring about, and is only complete in the Palæozoic coal measures, has been here produced in the middle Tertiary beds. This perfect mineralisation is unfortunately accompanied by a great disadvantage, the strata being so broken with faults that it is difficult to work the lignite. A railway has been made to convey the lignite to the coast at Torre.

Not many miles south of Massa Marittima is the lignite basin of Monte Massi and Tatti (*Grosseto*), in Val di Bruno, where a shaft has lately been sunk. The section of the strata in the shaft is:—

Clay	63 feet.
Lignite	11 "
Clay	30 "
Good Lignite	3 "

In some parts there are three beds, of which one is upper Tertiary, the other two lower Tertiary. The strata are less broken here than at Montebamboli, but the lignite, although perfectly adapted for glass works, brick works, steam-engines, &c., is less bituminous.

The mine of Sarzanello is situated on the confines of the province of Genoa and of the former kingdom of Sardinia. It has been worked with considerable activity for several years, as the lignite has been employed at the lead works of Pertusola, on the gulf of Spezia, and also for the steam vessels of the Sardinian Navy. Now that a large arsenal is required at the port of La Spezia, as well as a coaling dépôt for steam vessels of the royal and mercantile navies, it is very convenient to possess such excellent lignite so near. There are two beds, the first of 7 inches thick, followed by 6 feet of highly bituminous schists, which undergo spontaneous combustion on exposure to the air, then 6½ feet of good black, resinous-looking lignite.

The first researches were made at Caniparola (*Massa and Carrara*) in 1824, and two years later by Signor Schneider, of Monte Catini; the mine was shortly afterwards abandoned to be only resumed in 1857, the present engineer being M. Pirchker.

Prof. Cappelini gave the following section of the strata at Caniparola, in the *Memorie della reale Accademia delle Scienze di Torino*:—

	Feet.	in.
Coarse conglomerate	60	0
Numerous thin alternating beds of clay and conglomerate	262	0
Coarse conglomerate	33	0
Clay, sand, and schistose clay	8	0
Conglomerate	26	0
Clay and <i>Mollasse</i> , with vegetable remains	157	0
Dark clay, containing fragments of shells and <i>Chara Escheri</i>	0	8
Ash-grey clay	0	4
Blackish argillaceous schists, containing beds of lignite only a few inches thick, except one of 1 metre (3ft. 4 in.), and another of 30 centim. (16 in.), separated from each other by a thin stratum of schist, so that both are worked together	20	0
Total	567	0

—(Serie II., tom. XIX.)

These strata dip at an angle of 60°, and rest on *Alberese* limestone.

The fossil flora of these beds at Caniparola and Sarzanello is given by Capellini as follows:—

In the clay:—*Juglans acuminata*, *Chara Escheri*, *Phyllites Sarzanellanus*, *Sapocites minor*.

In the Mollasse:—*Quercus Charpentieri*, *Fagus attenuatus*, *Berchemia multinervis*, *Betula denticulata*, *Andromeda protogea*, *Rhamnus ducalis*, *Celastrus Capellini*, *Cinnamomum Scheuchzeri*.

In both clay and Mollasse:—*Sequiva Langsdorfi*, *Platanus aceroides*, *Populus leucophylla*, *Carpinus pyramidalis*, *Laurus princeps*, *Oreodaphne Heerii*, *Hedera Strozzi*, *Pterocarya Massalungi*, *Glyptostrobus europæus*, *Planera Ungleri*.

The most important lignite mine in Piedmont is that of Cadi-Bona, seven miles north of Savona (*Genoa*), discovered in 1786, and belonging to Marquis Pallavicini. There is only one bed, varying in thickness from 1·50 mètres (4½ feet), to 4·10 mètres (13½ feet), the average being 2·20 mètres (7 feet), with an inclination of 8° or 10° to the north.

1 kilo. produces, by distillation,	220 litres of gas.
"	0·64 kil. of coke.
"	0·65 kil. of tar.
"	0·035 kil. of ammoniacal water.

Completely dried it loses 17 per cent. of its weight.

The price on the spot is 15·50 *lire* (12s. 6d.) per ton for the large lumps, and 4·50 *lire* (3s. 7d.) for the small coal.

The new mine of Podernuovo, in Val di Cecina (*Pisa*), is worked on two beds of lignite 1·20 mètres (4 feet) in thickness, dipping at an angle of 4° and separated by 1 foot of argillaceous marl, containing *Planorbis*, *Paludina* and other fresh-water shells; the same clay occurs under the lower bed of lignite.

Marquis Ginori-Lisci has commenced working a mine at Querceto, near Podernuovo (*Pisa*), whence he obtains perfectly black lignite, in which the woody texture has not been destroyed; but the calorific power is far inferior to that of Montebamboli or Tatti. This lignite produces, when struck, the peculiar sound given by charcoal, which it resembles very closely.

An infinity of small lignite basins exist on the east of the Apennines, as in the Provinces of Parma, Modena, Macerata, Forlì, Ravenna, &c.

The lignite of Monte Nerone, near Piobbio (*Pesaro and Urbino*), is many yards thick—it occurs in *Alberese* limestone. It is supposed that there is a good deal of lignite in this Province, both in the Sub-Appennine marls and in the Cretaceous rocks.

1 kilo. produces, by distillation,	200 litres of gas.
"	0·66 kil. of coke.
"	0·88 kil. fluid bituminous matter.
"	0·06 kil. ammoniacal water.

without a trace of sulphur.

The specific gravity is 1·17; it loses 6 per cent. of its weight on being dried. The calorific power is stated by

Guidi to be 4:5 compared with true coal. It has not hitherto been worked.

Good lignite is mentioned by Prof. Costa as occurring on the Tordino, in Val S. Giovanni, near Teramo (*Abruzzo Ulteriore I.*) In the province of Abruzzo Citeriore on the Adriatic, good lignite occurs at many places, as at Guardiagrele, Pennapiedimonte, Gessopalena, Roccasalegna, &c. Some of the best lignite in the Italian department of the Exhibition is that from Corsoli, in the Abruzzi; unfortunately, it is impossible to judge from a small specimen whether there would be sufficient to render it fit to work. At Baranello (*Molise*), excellent lignite is found in micaceous argillaceous schists. Small lignite basins are abundant in Calabria, as at Gerace, Squillace, Catanzaro, &c., they are not worked.

The carboniferous formation has been found to exist in the centre of the island of Sardinia, by General la Marmora, near the villages of Seni and Perdas de fogu, but it is so broken up by porphyry eruptions, which have converted the coal into anthracite, as to be of no industrial importance, the more so as there are no roads to convey it to the sea.

Two Eocene lignite basins occur near Iglesias (*Cagliari*), those of Gonnesa and Villamassargia, the former calculated by Signor Marchese to have an area of 50, the other of 100 square kilometres. There are several beds of lignite in the basin of Gonnesa, in which four mining concessions have been granted, viz., Terras de Collu, Bacu Abis, Fontanamare and Terra Segada. At Terras de Collu a bed of about 2½ feet has been found immediately under a stratum of limestone, which renders it very convenient for working. Two beds, respectively 1ft. 8in., and 2ft. 8in., might be utilized at Bacu Abis. At Fontanamare is a bed of 3ft. 6in., only divided into two by a very thin layer of black clay, and which might be turned to account like the others for local consumption, were it not for the entire absence of road communication.

Of the lignite in Sicily, that of Milazzo (*Messina*), is of very inferior quality; but, by a proper geological examination of the island, it is very probable that many places might furnish lignite of far better quality.

ANALYSES OF ANTHRACITE AND LIGNITE FROM NORTHERN AND CENTRAL ITALY.

	ANTHRACITE.			LIGNITE.				
	Friedmaz (Turin).	Le Cretaz, Le Villaret, and Bosco della Golett (Turin).	La Borasina (Genoa).	Cadibona (Genoa).	Sarzana (Genoa).	Bagnasco and Nucetto (Cuneo).	Poggi di Ceva (Cuneo).	Monte Nerone, Piobbino, Pesaro, and Urbino).
Carbon	49·3	48·0	32·55	46·5	37·68	35·4	43·85	46·3
Volatile matter	10·1	13·0	47·20	47·4	64·03	49·0	51·00	46·3
Ashes	39·6	39·0	20·55	6·1	8·29	15·5	5·15	6·9
TOTAL.....	99·0	100·0	100·30	100·0	100·00	99·9	100·00	100·0
Quantity of lead reduced }	17·0	15·0	18·71	20·5	17·76	19·33		

PRODUCTION OF ANTHRACITE AND LIGNITE IN THE FORMER KINGDOM OF SARDINIA, FROM 1851 TO 1857, IN MYRIAGRAMMES.

NAME OF MINE.	1851.	1852.	1853.	1854.	1855.	1856.	1857.
Le Cretaz (Turin)	24,620	18,470	29,180	5,000	4,000	1,000	670
Bosco della Golletta (Turin)	6,000	4,000	3,000	2,500	2,000	400	360
Bagnasco and Nucetto (Cuneo) ... Lignite.	450,000	200,000	200,000	400,000	468,040	...	...
Poggi di Ceva (Cuneo)	700	...	...	...	700	...	...
Cadi Bona (Genoa)	200,000	160,000	390,000	1,500,000	2,000,000	2,405,050	...
Momello mine, Lanzo (Turin) ...	...	...	...	...	...	7,400	...
Boca (Novara) .....	...	...	...	2,000	4,000	11,000	...
La Borasina (Genoa) .....	...	...	...	...	400	400	...
Terras de Collu (Cagliari) .....	...	...	...	150,000	..	...	...

Petroleum is found in numerous places in Italy, especially in the Apennines. In general it issues between the Pleiocene and Pleistocene strata, and is procured by digging wells, where it floats at the surface of the water, from whence it is removed from time to time. Such artificial pits exist at Montechiaro, near Placenza, Amiano, near Parma, Monte Zibio, Monte Festino and Monte Bonello, near Modena. Brugnattelli estimates the quantity which might be daily procured at Amiano, as 1,500 lbs. At Monte Zibio it is in immediate contact with a lignite bed. At Pietramala on the southern slope of the Apennines, and close to the road from Bologna to Florence, there is a naphtha spring, known as the *Vulcano*, whence flames issue constantly, and may be seen distinctly at night.

Spontaneous combustion is also observed in the Borra di (inatti, near Berberino, in Val d'Elsa (*Pisa*)). The bituminous calcareous tufa at S. Querceto (*Sienna*), gave Bechi on distillation 4 per cent. of oil, whence naphtha could be procured by re-distillation.

It may appear to some that the result of this brief examination of the lignite fields of Italy is unfavourable. Far otherwise. Fuel may not, indeed, be abundant, but that is no reason why the small quantity she possesses should be thrown away. It is a wise Providence which has so arranged that no country, however favoured, should be able to do without the others, and while the liberty which Italy now enjoys, and the numerous inducements to rouse herself from lethargy, all point to the necessity of developing the industrial resources and manufactures of the country, it will be no less imperative to encourage foreign trade in those commodities which, like coal, she does not possess, in exchange for those she exports.

The inferior qualities of lignite in Italy, though not possessing great calorific power, contain mineral oils which might be turned to good account by distillation, and return large profits. It need only be mentioned that at Halle, in Prussian Saxony, the manufacture of oil paraffine, and the valuable series of tar dyes, from Tertiary brown coal, has been carried on of late years with wonderful success, and is daily increasing. What an advantage it would be if the lignite scattered through more than a dozen provinces of Italy, should be employed in the manufacture of oil and candles, which might be as easily and extensively exported to Western Europe as those of Prussia. The Italian Government would do well to give every encouragement to the establishment of such manufactories in Italy, as the high prices at which the products of distillation are sold would permit them to form an important article of export.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Thirty-second Annual Meeting of the Association commenced on Wednesday, October 1, 1862, at Cambridge, under the direction of the following officers:—

PRESIDENT.—The Rev. Robert Willis, M.A., F.R.S., Jacksonian Professor of Natural and Experimental Philosophy, Cambridge.

VICE-PRESIDENTS.—The Rev.—Phillips, President of Queen's, Vice-Chancellor of the University; the Very Rev. the Dean of Ely, D.D.; the Rev. W. Whewell, D.D., F.R.S., Master of Trinity College; the Rev. A. Sedgwick, M.A., F.R.S., Woodwardian Professor of Geology; G. B. Airy, Esq., M.A., F.R.S., Astronomer Royal; Rev. J. Challis, M.A., Plumian Professor of Astronomy and Experimental Philosophy; G. G. Stokes, Esq., M.A., F.R.S., Lucasian Professor of Mathematics; J. C. Adams, Esq., M.A., F.R.S., Lowndesian Professor of Astronomy and Geometry, and President of the Cambridge Philosophical Society.

GENERAL SECRETARY.—William Hopkins, Esq., M.A., F.R.S., St. Peter's College, Cambridge.

ASSISTANT-GENERAL SECRETARY.—John Phillips, Esq., M.A., LL.D., F.R.S., Professor of Geology, Oxford.

LOCAL SECRETARIES.—C. C. Babington, Esq., M.A., F.R.S., Professor of Botany, St. John's College, Cambridge; G. D. Liveing, Esq., M.A., Professor of Chemistry, Cambridge; Rev. N. M. Ferrers, M.A., Gonville and Caius College, Cambridge.

GENERAL TREASURER.—W. Spottiswoode, Esq., M.A., F.R.S., 19, Chester-street, Belgrave-square, London, S.W.

LOCAL TREASURER.—Rev. W. M. Campion, B.D., Tutor of Queen's College, Cambridge.

The General Committee held its first meeting in the Guildhall, on Wednesday, October 1st, at one p.m., for the election of sectional officers, and the despatch of business.

The following report from the Council was read and adopted:—

1. The Council were directed by the General Committee at Manchester to maintain the establishment of the Kew Observatory, and a grant of £500 was placed at their disposal for the purpose. They have received at each of their meetings regular accounts of the proceedings of the Committee of the Observatory, and they now lay before the General Committee a General Report of these proceedings during the year 1861-62. (See Report of Kew Committee for 1861-62).

2. A sum of £40 was placed at the disposal of the Kew Committee for the employment of the Photoheliometer; and a further sum of £150 for the purpose of obtaining a series of photographic pictures of the Solar surface, with the co-operation of the Royal Society. The Report of the Kew Committee will make known the results of these recommendations.

3. The Report of the Parliamentary Committee has been received by the Council for presentation to the General Committee to-day, and is printed for the information of the Members.

4. The Council have to regret the absence from this Meeting of the General Secretary, Mr. Hopkins, through indisposition, which they sincerely hope will soon be removed.

5. The "Classical Index" to the Transactions of the Association, which was authorized to be prepared under the direction of Professor Phillips, is completed in one of the main divisions; the remainder will be printed without delay, and will be delivered to the Members who have subscribed for it before the end of the present year.

6. At that date it is the request of Professor Phillips to be allowed to withdraw from the office of Assistant-General Secretary to which he has been appointed, by Annual Election in the General Committee, for nearly thirty-two years. Having for two years received the useful aid of Mr. G. Griffith, M.A., of Jesus College, Oxford, he has expressed to the Council his conviction of the fitness of that gentleman to undertake the duties which have been so long entrusted to himself.

7. The Council having considered the subject, and having ascertained from Professor Phillips that he would be happy to co-operate with Mr. Hopkins as Joint General Secretary in the next year, recommend that the arrangement here suggested be carried out by the General Committee.

8. The Council received in April, 1862, a communication from Mr. John Taylor, Jun., and Mr. Richard Taylor, requesting that on account of his great age, their father, Mr. Taylor, might be relieved of all further duties as General Treasurer and Co-Trustee of the Association. The warmest thanks of the Council were given to Mr. Taylor, for his kind attention and most valuable services rendered to the Association in two important offices, as one of the Trustees and sole General Treasurer, and their regret that any cause should render it necessary for him to desire to be relieved from the duties which he has so efficiently performed for the great advantage of the Association, almost from its foundation.

9. Sir Philip de Grey Egerton, Bart., was then requested to accept the office of a Trustee of the British

Association; and Mr. W. Spottiswoode to undertake the duty of General Treasurer to the Association.

These gentlemen have kindly consented to act, and have entered on their duties.

10. The Council have been informed that Invitations will be presented to the General Committee at this meeting on Monday, October 6, from Newcastle-on-Tyne, Birmingham, Bath, Nottingham, and Dundee.

11. That the Vice-Chancellor of the University of Cambridge and the Rev. Professor Challis be elected Vice-Presidents for the next year.

The First General Meeting of the Association was held in the Guildhall, on Wednesday, October 1st, at eight, p.m., precisely, when William Fairbairn, Esq., LL.D., F.R.S., resigned the chair, and the Rev. Robert Willis, M.A., F.R.S., Professor of Natural Philosophy in the University of Cambridge, assumed the presidency and delivered an address, from which the following are extracts:—

I have the honour to announce to you that we are now opening the 32nd meeting of the British Association, and are for the third time assembled in this University. At its first coming hither in 1833, its organization was scarce completed; its first meeting having been devoted to explanations, discussions, and allotment of work to willing labourers; its second meeting to the reception of the first instalment of those admirable preliminary reports which served as the foundation of its future labours, and to the division of scientific communication to the sectional committees. But it was at Cambridge that the original plan of the association bore fruit by the receipt of the first paper, which contained the results of experiments instituted expressly at the request of the association. The success of the association was now confirmed by the numbers of compositions and annual subscriptions paid in; and by the help of these funds a most important measure was introduced—namely, the practice of granting, in aid of philosophical researches, to be undertaken by individuals or committees at the request of the association, sums of money to meet the outlay required for apparatus or other expenses, which could not be asked from persons who were otherwise willing to devote their time to the advancement of science. It was at Cambridge that the importance and authority of the association had become so manifest that the first of its applications for Government assistance towards scientific objects was immediately complied with by the grant of £500 to reduce the Greenwich observations of Bradley and Maskelyne. At this third meeting improvements were made in the distribution of the sciences into sections, and a section of statistics added. The only change in this respect that was subsequently found necessary was in the establishment of a separate section for mechanical science applied to the arts, in 1837. The employment of alphabetical letters to distinguish the sections had been introduced in 1835.

I have said enough to claim for the Cambridge meeting the honour of completing the development of the association, and I may be permitted to quote from our fourth report the gratifying assurance that so obvious was the utility of the proposed undertaking that in its very infancy there were found several distinguished individuals, chiefly from the University of Cambridge, who volunteered to undertake some of the most valuable of these reports which appeared in the first volume of the proceedings. With a mixture of regret and shame I confess that although my name is enrolled in the honourable list of those who undertook reports, it will be sought in vain amongst those who promptly performed their promises. Yet I may be permitted to say that I still hope to be enabled at some future time to complete the "Report on Acoustics," of which I delivered merely an oral sketch at the second meeting of the association in 1832. The association quitted Cambridge to pursue, with its matured organisa-

tion and continually increasing stability and influence, the career of brilliant and useful labours in every branch of science that it has never ceased to run during the two-and-thirty years that have elapsed since its foundation. It revisited Cambridge after an interval of 12 years in 1845; and now, after a lapse of 17 years, we have the high gratification of welcoming once more the association to this scene of its early meetings.

This appears a fitting occasion for a concise review of the leading principles and prominent labours of the body. Scientific societies, as usually constituted, receive and publish papers that are offered to them by individuals, but do not profess to suggest subjects for them, or to direct the modes of investigation, except in some cases by offering prizes for the best essay on some given branch. This association, on the contrary, is not intended to receive or record individual originality; its motto is suggestion and co-operation, and its purpose is thus to advance science by co-operation in determinate lines of direction laid down by suggestion. To give form and authority to this principle the admirable conception of suggestive reports was in the first place developed—a collection that should constitute a general survey of the sciences as they stood at the foundation of the meeting, each branch reported by some member who had already shown his devotion to the cultivation of it by his own contributions to its advancement, and each report passing in review its appointed subject, not for the purpose, of teaching it, but of drawing forth the obscure and weak places of our knowledge of it, and thus laying down the determinate lines of direction for new experimental or mathematical researches. The requests for these reports were zealously responded to, and so rapidly that at the second meeting ten were received, and at the third eight others. In this manner in five or six years the cycle of the sciences was well nigh exhausted. But the series of such reports has been maintained in succeeding years even to the present time by the necessity of supplementary reports to point out not merely the advances of each science already treated, but the new lines of direction for inquiry that develop themselves at every step in advance. The reports thus described must be considered as merely preparations for the great work for which the Association was founded. They constitute the suggestive part of the scheme. The co-operative mechanism, by which each new line of research recommended in the reports was to be explored, was energetically set in motion by the annual appointment of committees, or individuals to whom these special investigations were respectively assigned, with adequate sums at their disposal. These committees were requested to report their labours from year to year, and thus a second set of documents have been produced, which are entirely distinct from the "Suggestive Reports," but immediately derived from them, and complementary to them.

Such is a concise view of the system at first laid down by the wisdom of our founders, and which, with some modifications, has produced the inestimable contents of our present volumes.

* * * * *

I will now direct your attention to the principal objects to which our funds have been directed. There are, undoubtedly, a great number of most important inquiries in science that are arrested because from their nature they require an outlay of money beyond the reach of the labourers who ardently desired to give their time and thoughts to them, and because the necessity and value of the proposed investigations are wholly unappreciable by that portion of society who hold the purse strings. But it is in the cases above alluded to of expensive investigation that the direct use and service of our body has been made the most manifest. The British Association holds its own purse strings, and can also perfectly understand when they should be relaxed. Nay, more, by its influence and character, established by the disinterested labours and successful exertions of more than thirty years, it may be said to command the national

funds, for the objects in aid of which Government assistance has been requested have been so judiciously chosen that such applications have very rarely been unsuccessful, but have been, on the contrary, most cordially acceded to. Indeed, it may be observed, that from the period of the foundation of the association the Government of this country has been extending its patronage of science and the arts.

* * * * *
One of the most valuable gifts to science that has proceeded from our association is the series of its printed reports, now extending to thirty volumes; yet these must not be supposed to contain the complete record even of the labours undertaken at the request and expense of the body. Many of these have been printed in the volumes of other societies, or in a separate form. Several, unhappily, remain in manuscript, excluded from the public by the great expense of publication. I am the more induced to direct attention to this great work at present because I hold in my hand the first printed sheets of a general index to the series from 1831 to 1860 * * * * *; and the prospect of its speedy publication may be hailed as a great subject of congratulation.

In every annual volume there is a table of the sums which have been paid on account of grants for scientific purposes. The amount of these sums has now reached £20,000, and an analysis of the objects to which this expenditure is directed will show that if we divide this into eighteen parts it will appear, speaking roughly, that the section of mathematics and physics has received 12 of these parts—namely, two-thirds of the whole sum; the sections of geology and mechanical science two parts each, while one part has been given to the section of botany and zoology, and one divided among the sections of chymistry, geography, and statistics. If we examine the principal subjects of expenditure, we find in the first place that more than £1,800 was expended upon three catalogues of stars. £150 was applied principally to the determination of the constant of lunar nutation under the direction of Dr. Robinson in 1837, and to several other minor astronomical objects. Under the direction of Dr. Whewell, a laborious system of observations obtained by the influence and reduced at the expense of the association, who have aided this work with a sum of about £1,300, has determined the course of the tide wave in regard to the coasts of Europe, of the Atlantic, of the United States, of New Zealand, and of the east coast of Australia. More than £2,000 has been allotted to meteorology and magnetism, for the construction of instruments, and the carrying out of a series of observations and surveys in connexion with them. To this must be added a sum between £5,000 and £6,000 for Kew Observatory.

To the British Association is due, and to the suggestion of General Sabine, the first survey ever made for the express purpose of determining the positions and values of the three isomagnetic lines corresponding to a particular epoch over the whole face of a country or state. This was the magnetic survey of the British Islands, executed in from 1834 to 1835, by a committee of its members. This was followed by a recommendation from the association to Her Majesty's Government for the equipment of a naval expedition to make a magnetic survey in the southern portions of the Atlantic and Pacific Oceans. This recommendation, concurred in by the Royal Society, gave rise to the voyage of Sir James Clark Ross in the years 1839 to 1843. In a similar manner was suggested and promoted the magnetic survey of the British possessions in North America, authorized by the Treasury in 1841; the completion of the magnetic survey of Sir James Ross, by Lieutenant Moore and Lieutenant Clerk in 1845, in a vessel hired by the Admiralty; the magnetic survey of the Indian seas by Captain Elliot in 1849, at the expense of the Directors of the East India Company; and the magnetic survey of British India, com-

menced by Captain Elliot in 1852, and completed between 1855 and 1858 by Messrs. Schlagintweit. Finally, in 1857, the British Association requested the same gentlemen who had made the survey of the British Islands in 1837 to repeat it, with a view to the investigation of the secular changes of the magnetic lines. This has been accomplished, and its results are printed in the new volume for 1861. The association also, aided by the Royal Society, effected the organization in 1840 of the system of simultaneous magnetical and meteorological observations established as well by our own Government as by the principal foreign Governments at different points of the earth's surface. In 1854, in consequence of representations originating with the British Association, our Government created a special department in connection with the Board of Trade, under Admiral Fitzroy, for obtaining hydrographical and meteorological observations at sea. Observations on the wind have been carried on by means of the various self-registering anemometers of Dr. Whewell, Mr. Osler, Dr. Robinson, and Mr. Beckley, which instruments have been improved, tested, and thoroughly brought into practice by the fostering care of our body; and by the aid of its funds experiments have been made on the subterranean temperature of deep mines, and on the temperature and other properties of the atmosphere at great heights by means of balloon ascents. Four of these were made in 1852, in which heights between 19,000 feet and 20,000 feet were reached. But in the present year Mr. Glaisher has attained an altitude of nearly 30,000 feet. Earthquake shocks were registered in Scotland by a committee of the association from 1841 to 1844, and Mr. Mallet commenced in 1847 a most valuable series of reports on the facts and theory of earthquake phenomena from the earliest records of our own time.

* * * * *
The President then gave a brief account of the Kew Observatory, the creation of which, he said, must be regarded as one of the triumphs of the British Association. As far as the association is concerned, its maintenance has absorbed between £5,000 and £6,000, and the annual sum allotted to it from our funds has for each of the last six years reached the amount of £500. The construction of the photoheliograph may be quoted as an example of the facilities given by this establishment for the developing and perfecting of new instruments of observation. A suggestion of Sir John Herschel, in 1854, that daily photographs of the sun should be made has given birth to this remarkable instrument, which at first bore the name of the solar photographic telescope, but is now known as the Kew photoheliograph. * * * * * On occasion of the eclipse in 1860 this instrument was conveyed to Spain, under the care of Mr. Delarue, who most successfully accomplished the proposed object by its means. Mr. Delarue, in consequence of the presence of the heliograph at Kew being found to interfere with the ordinary work of the establishment, has kindly consented to take charge for the present of the instrument at this observatory and at his own observatory when celestial photography is carried on. But it is obvious that the continuation of these observations for a series of years, which is necessary for obtaining the desired results, cannot be hoped for unless funds are provided.

I cannot conclude this sketch of the objects of the physical section to which the funds of the association have been principally devoted without alluding to Mr. Scott Russell's valuable experimental investigations on the motion and nature of the waves, aided by £274.

If we now turn to geology, we find £2,600 expended; of which, £1,500 was employed in the completion of the fossil ichthyology of Agassiz, and Owen's reports on fossil mammalia and reptiles, with some other researches in fossils. * * * * * £2,300 has been devoted to the carrying out of various important experimental investigations in relation to the section of mechanical science. Of this sum £900 was paid between 1849 and 1844, in aid of the most important and

valuable series of experiments on the forms of vessels, principally conducted by Mr. Scott Russell, in connection with the experiments on waves. This investigation was ready for the press in 1844, but it is greatly to be regretted that the great expense of printing and engraving it has hitherto prevented its publication. Nearly the same sum has given to us various interesting and instructive experiments and facts relating to steam engines and steam vessels, carried on by different committees from 1838 to the present time, among which may be specially noted the dynamometric instruments of MM. Morin, Poucelot, and Moseley, to ascertain the duty of steam engines from 1841 to 1844. Experiments on the strength of materials, the relative strength of hot and cold blast iron, the effect of temperature on their tensile strength, on the effect of concussion and vibration on their internal constitution, carried on principally by our late president, by the late Mr. Eaton Hodgkinson, at different intervals from 1838 to 1856 have been aided by grants amounting to £400. The remainder of the sum above-mentioned was principally devoted to the experimental determination of the value of railway constants by Dr. Lardner and a committee in 1838 and 1841.

The section of botany, zoology, and physiology has absorbed about £1,400, of which nearly £900 has been applied to zoology, partly for the expense of dredging committees, for obtaining specimens of marine zoology, but principally for zoological researches in different districts and countries.

In botany may be remarked the labours of a committee consisting of Professors Daubeny, Henslow, and others, formed in 1840 to make experiments on the preservation of vegetative powers in seeds, who continued their work for 16 successive years, reporting annually, and assisted by a sum of £200. The greatest age at which the seeds experimented upon were found to vegetate was about 40 years. Another committee, with Mr. Hunt, was engaged during seven years, from 1841, in investigating the influence of coloured light on the germination of seeds and growth of plants. These are specimens of the admirable effect of the organization of an association in stimulating and assisting with funds the labours of investigators in new branches of experimental inquiry.

The President then referred to the report of the Manchester meeting, and instanced some of the most striking advances since made in the various sciences. He then said:—"Before I conclude I have the painful duty of reminding you that since our last meeting we have had to deplore the loss of that most illustrious patron of science and art, his Royal Highness the Prince Consort, the President of our Association at Aberdeen, and the Chancellor of this University. In the latter capacity he afforded us many opportunities of observing his scientific attainments and genuine zeal and love for all branches of knowledge. His gracious kindness and respect for men of science and literature have left an impression upon us that can never be effaced. I must also ask a tribute to the memory of our late professors of chemistry and botany, both of whom did in their lifetime excellent good service to science, and more especially to the British Association—Professor Cumming contributing one of the invaluable primary reports upon which our proceedings were based, as well as other communications; Professor Henslow by various reports, some of which I have already alluded to.

At the close of the address,

Professor OWEN moved a vote of thanks to the learned President for his comprehensive, varied, and excellent address.

The Dean of Ely seconded the motion. The clergy of the Church of England most cordially recognized the excellence of the work of the British Association, and with all heartiness and solemnity wished them God-speed in their great work.

The resolution was carried with acclamation.

Professor WILLIS acknowledged the compliment; after which the meeting broke up.

The sections and officers are the following:—

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

President:—G. G. Stokes, Esq., M.A., F.R.S., Lucasian Professor of Mathematics.

Secretaries:—Professors Stevelly, H. J. S. Smith, and R. B. Clifton.

B.—CHEMICAL SCIENCE.

President:—W. H. Miller, M.A., Esq., F.R.S., Professor of Mineralogy.

Secretaries:—W. Odling, Esq., M.B., F.R.S., and H. W. Elphinstone, Esq., M.A.

C.—GEOLOGY.

President:—J. B. Jukes, Esq., M.A., F.R.S., Director of the Geological Survey of Ireland.

Secretaries:—Professor T. Rupert Jones, and Lucas Barrett, Esq.

D.—ZOOLOGY AND BOTANY, INCLUDING PHYSIOLOGY.

In the Hall of Gonville and Caius College.

President:—Thomas Huxley, Esq., F.R.S., Secretary of the Geological Society.

Secretaries:—Dr. E. P. Wright, and A. Newton, Esq., M.A.

SUB-SECTION D.—PHYSIOLOGY.

President:—G. E. Paget, Esq., M.D.

Secretaries:—Edward Smith, Esq., M.D., F.R.S., and G. F. Helin, Esq.

E.—GEOGRAPHY AND ETHNOLOGY.

President:—F. Galton, Esq., M.A., F.R.S.

Secretaries:—Dr. Norton Shaw, and Thomas Wright, Esq., M.A.

F.—ECONOMIC SCIENCE AND STATISTICS.

President:—Edwin Chadwick, Esq., C.B.

Secretaries:—Edmund Macrory, Esq., and H. D. Macleod, Esq.

G.—MECHANICAL SCIENCE.

President:—William Fairbairn, Esq., LL.D., F.R.S.

Secretaries:—P. Le Neve Foster, Esq., M.A., and W. M. Fawcett, Esq., M.A.

ELECTRIC FIRE TELEGRAPHS ON THE CONTINENT.

The following is a translation of a description of the electric fire telegraph at Stuttgart:—

This telegraph was first proposed by, and carried out from the plans and under the superintendence of the telegraph-inspector, Geiger. In its use it serves a double purpose:—First, to give timely notice to the parties immediately interested in the outbreak of a fire; secondly, to enable the Police Board to exercise a control by day and night over the fire watchmen stationed on the watch towers.

The wires have their central point in the City Police Office, and extend from thence to the tower of the cathedral (Stiftskirchenturm) and the Infirmary Church Tower (Spitalkirchenturm), which constitute the first telegraph circle. From thence they extend to the Royal Town Administration Office, the Town Hall, Guard-room, the dwelling of the Commander of the Fire Brigade, the Barracks, and the Chief Guard-house, which constitute the second telegraph circle.

At the City Police Office are placed the electrical battery, the alarm, the keys (similar to the manual of a piano-forte), and the printing apparatus upon Morse's principle. In each of the towers is an alarm, on which the signals are given from the police office, and a key or handle with which to return the signals. The alarm is so placed that it can be heard by the watchman (when "watchman" is mentioned in this description it means a *hugo*, those on the two towers) in his room as well as when he is on his rounds. The handle is so arranged that the

watchman can get at it without having to make a perfect round. In the Royal Town Administration Office is also an alarm and a key or handle; the rest of the stations of the second circle, however, have only an alarm, so that they can only receive, but not give signals.

In order to be able to give notice in which part of the town a fire has broken out, the town is divided into three "rayons" or circles, the cathedral being the centre, which are called the inner circle, the outer circle, and the environs of the town. From the centre point of the octagon gallery of the tower eight radii are formed, which divide each rayon into eight, whereby the town and its environs become divided into twenty-four districts. Each space between two radii has a special number, and a plan of the town divided in this manner is kept at each telegraph station. The telegraphing is carried out by means of pressing down the keys, and the signals are known by the number of strokes, and by the space of time between each stroke. The printing apparatus registers these by means of dots, strokes (—), and spaces. The signal on the alarm is either a simple short blow—so long as one can count 1, 2, 3, quick—or a sort of ringing, done by striking the key continuously till one counts from 1 to 6. A space is the time between taking the finger off the key and again striking it. The space is a "short" one when 1, 2, 3, are counted, and a "long" one when one counts to 6 before again striking the key, both being counted quick. To enable the City Police Office to give a telegram to the second telegraph circle, two slides, numbered 1 and 2 on the apparatus are put in. The printing apparatus can work slow or fast, as wished. The slow motion is used when controlling the watchmen, the quick motion when giving notice of a fire.

The signals for the announcement of a fire are as follows:—First, "The summons," whereby all the stations which it is intended to communicate with have their attention called that a telegram is coming. The summons of the watchmen to the City Police Office consists of 6 strokes and 5 short spaces. That from the cathedral is once rung, and that from the infirmary twice rung with a long space. The summons of the City Police Office on all the stations is three times rung with two long spaces. Secondly, "Understood or ready." This is the answer from the station communicated with, that all is in readiness to receive the telegram. This signal consists of six strokes and five short spaces, both for the watchmen as well as for the police office. The answer "understood" has to be returned every time when a telegraph to announce a "fire," "danger," or "situation of the danger" of "fire" is given. When not given, the telegram is repeated till the answer is returned. Thirdly, "Danger." When the watchmen observe an unusual quantity of smoke, such as to give him cause to apprehend a fire may break out, or notices in the environs of the town an unimportant fire in any of the gardens, he gives this signal with 12 strokes and 11 short spaces. Fourthly, "Fire." If, however, he observes actual flame, he then immediately gives the fire signal, which consists of 30 to 40 strokes given quickly one after the other. Fifthly, "Situation of the danger or fire." After the watchman has given notice of the "danger" or "fire" he waits until he can count 18, and then gives notice where the "danger" or "fire" is. The numbers 1 to 8 signify the spaces lying between each two radii, and are given notice of by 1, 2, 3, &c., with long spaces. These numbers without any addition denote the inner circle. Should, however, one of the outer circles have to be denoted he must count 18 after the number has been given, and then give 2 strokes, with a long space, for the outer circle, and 3 strokes, with 2 long spaces, for the environs. If the watchmen give notice of "danger," the city police give notice of this to the second telegraph circle, that all may hold themselves in readiness in case of emergency, and the police immediately investigate whether ground for danger really exists or not. In the affirmative case the watchman get notice to give the "fire" alarm (see No. 4),

which is immediately done. The city police give also the same alarm to the second circle. If, however, it is found unnecessary to give the "fire" signal, then the watchmen and the second circle receive the signal "no danger," which consists of 3 strokes and 2 short spaces. That the second circle may understand this more certainly the city police repeat the signal after a long space of time. The signals for controlling the watchmen are—Firstly, "The summons," which the police office, as before, telegraph to the two towers, with 3 strokes and 2 long spaces, which takes place at the time when the night duty begins. The night duty is, in the months of December and January, from six o'clock in the evening till seven o'clock in the morning; from February till April, and September till October, eight o'clock to six o'clock; and from May till August, nine o'clock to five o'clock. Secondly, "Night duty begun" is the answer the watchmen give to this signal. The watchmen at the cathedral answer with a signal stroke, that at the infirmary with 2 strokes and 1 long space. Each watchman has to repeat this signal every half-hour—the one at the cathedral at the half and full hours, and the other at the infirmary at the quarters and three-quarters. In the daytime these signals are repeated every hour, viz., from the cathedral at the full hours, and from the infirmary at the half-hours. Thirdly, After the police office have signalled the watchmen, they also signalise the second circle at the commencement of the night duty, with 3 strokes and 2 long spaces, to see that the whole of the apparatus is in proper working order, and are answered from the Royal Town Administration Office with "telegraph in order" by a single stroke. This call No. 3 is also heard at all the other stations of the second circle, but has for them no meaning, and they take no notice of it. Fourthly, The printing apparatus is principally to control the watchmen, and is so constructed that each time the watchmen press on the finger or handle in the towers, a short stroke (—) is indented on a strip of paper in the apparatus, which strip of paper can be made to travel quicker or slower through the instrument or stopped altogether as wished. For controlling, with slow motion, the papers travel at the rate of 4 in. in the hour, and so long as the watchmen give their signals regularly, the strokes follow each other at equal distances; should one of the watchmen, however, omit giving the signal, the strokes in this instance will be double as far apart as the rest; thus the watchmen are controlled without the presence of a third party.

At each station hangs a table with all the signals hereto given, so that any of the parties interested can at any time see what signals to give or what they signify.

Should a fire break out at night, at which time the fire brigade are on duty at the police office, they immediately start off to the scene of the fire, with the fire escape waggon; should the signal "Danger" be given they get themselves in readiness and wait for further instructions from the police, after the latter have investigated whether fire is present or not.

Thus, by the aid of this institution, it is now made possible, as soon as danger of fire is apprehended, to give notice of the same in the shortest possible time to the authorities and all parties interested, and at the same time to avoid all unnecessary alarm where no actual danger exists.

The following is a description of an electro-magnetic telegraph in connection with the fire establishments in Berlin:—

The electro-magnetic telegraph (Morse's system), which was first laid down in 1851, embraces the whole of the thirty-six police districts of the city, most of the dwellings of the police-lieutenants in which fire watch is kept, as well as the five outlying fire stations; and, further, the dwellings of the state ministers and the general post office. This last connects it with the state telegraph, the head fire station, and, as the central point, the royal police station.

The cost of this arrangement, which was carried out

under contract by Messrs. Siemens and Halske, was rather under £5,000, and the yearly expense of keeping it in order is about £750.

The staff of officers consists of an engineer, two chief and two sub-telegraphists. The duties at the sub-stations are fulfilled by the fireman on duty.

In the middle of the city, at the Royal Police Office, is the central station, from whence five electrical circuits are carried, embracing the stations of the inspectors of the fire brigade; also, a circuit to connect the different ministerial dwellings and the general post, and one line direct to the head fire station. For the before-mentioned five outlying stations, branch lines are taken from the nearest police station, which lines end in the watch room where an alarm apparatus is erected to give notice to the men on duty.

The wires are laid underground, 2½ feet deep, and are of copper, covered with gutta percha, in lead pipes, and cost about £120 a German mile (about 4½ths of an English mile). In the streets, where different wires meet, they are covered with earthenware covers, and in the neighbourhood of sewers or gas pipes they are laid in iron pipes to protect them from injury. Where the wires have to pass over the river Spree they are laid under the pavement of the massive bridges, but where drawbridges occur they are laid under the bed of the river in flexible pipes.

The apparatuses are Messrs. Siemen and Halske's (then) newest construction, with self-acting dial, and which, by thirty revolutions, communicates sixty to seventy words in a minute.

The batteries at the sub-stations consist each of twelve Daniell's cells; that at the chief station of eighteen Daniell's cells, with porcelain cylinders, 5 in. in diameter, 1 ft. high, and the copper and zinc elements in proportion, against which those at the sub-stations do not exceed the size of a beer glass. The whole of the apparatuses in the circuits are simultaneously fed by the battery in the central station. Attendance is constantly given at all the stations, and each despatch is accurately entered in a journal. All despatches, without any exception, must go through the central station, and through it alone are the connections of the stations with each other.

From the central station the despatches can be given either to a particular station alone, or they can be communicated to the whole of the stations simultaneously, and are distinguished by the name of station despatch, or circular despatch, accordingly. In the latter case (circular despatch), the circuit alone is used, which goes from the central station through all the stations; but, in the other case (station despatch), the circuit is made with the wire that goes to the particular station, the earth being the return. In this instance the connection to the further lying stations is, for the time, isolated, but these isolated stations can, in case of necessity, communicate any important despatch in the meantime to the central station by the remaining part of the circuit, using the earth as a return, and they are enabled to set an alarm apparatus in the central station in action.

The completion of the circuits, the forwarding and communicating the despatches, as well as the isolating, is done by a simple mechanical manipulation, for which special written instructions are given.

As an example of the mode of using the telegraph the following instance is given:—A fire breaks out, and notice is given to the nearest station, which is a police station, and whether the same is given by a private person or one of the brigade, it is immediately telegraphed to the central station. The despatch is sent in the shortest possible form, for which rules are laid down; it contains the name of the street, number of the house, and size of the fire, this last simply by the letters—G (gross), M (mittel), or K (klein), which denote large, middle, or small, as according to this is known whether many or few of the brigade must be called out. From the central station notice is then first given direct to the head fire station, and then

after, per circular, to all the sub-stations, and the whole is accomplished in about eight minutes.

The arrangements at the fire stations are such that in the course of three minutes everything is in readiness to start off, so that from the moment the notice is given to the central station, in five minutes at the head station, and in eleven minutes at the sub-stations, everything is in readiness to start to the scene of the fire.

The batteries are cleaned daily by the firemen on duty; repairs required to be done have to be reported to the central station, and are ordered to be carried out by the competent officer.

The wires here referred to were the first in which copper covered with gutta percha in lead pipes was used, and up to the present time, to judge from the little repair they require, they give the best wished for results of their stability.—*Engineer.*

UNBRANNING OF WHEAT.

In a report on the alleged grievances of the journey-men bakers, just made by Mr. H. Seymour Tremenheere, to the Secretary of State for the Home Department, a process of unbranning wheat is described, which seems likely to exercise an important bearing on the supply of food. Messrs. Hadley, of the City Flower-mills, states to Mr. Tremenheere as follows:—

"We have been making experiments for some time on the mode of unbranning wheat, invented by Mr. Bentz about the year 1846, in America, and subsequently patented. The object of this process is to separate the outer cuticle, which is wholly innutritious, from an interior section of the wheat-berry, which contains mostly nitrogenous matter, and which has hitherto been lost as human food.

"There are two leading advantages in this process. First, the cleanliness of the flour produced. In grinding by the ordinary process it is impossible to render the flour entirely free from dust and dirt. After putting the wheat through two or three processes of cleaning in the common way, there will still be some dirt remaining in it. All flour always contains more or less of this dust. There is also a portion of the beard of the wheat, a kind of fibrous appendage, which is always ground up with it; no process hitherto known has been able to get rid of it.

"By Mr. Bentz's process, as the exterior cuticle is entirely removed previously to grinding, the flour is necessarily perfectly clean, and free both from dust and this fibrous down.

Secondly, by the ordinary mode of grinding, the result obtained is 76 per cent. of flour for human use. By the new process we find, after a series of very careful experiments, extending over several months, that we obtain about 86 per cent. of the whole berry available to make bread.

"The money value of this increase of 10 per cent. is subject to a deduction of about one-half in consideration of the lessened quantity of offal, the value of which we may take at half of that of the flour if used as human food. The offal is used for many purposes, which give it a value larger than would at first sight be conjectured.

"In addition to this net increase of 5 per cent. in value of flour available for human food, the flour made by this process, containing all the nitrogenous or nutritious matter existing in the berry hitherto lost, yields a large increase in the number of loaves per sack. From the trials which we have ourselves made, we are satisfied that that increase may be safely stated at 20 lbs. of bread per sack of flour. This, taking the common average yield of a sack of flour at 90 four-pound loaves, or 360 lbs. of bread, amounts to an increase of upwards of 5 per cent. on the bread (18 lbs. would be exactly 5 per cent.)

"The aggregate gain in flour and bread may therefore safely be stated at 10 per cent.

"There is also another source of gain in a national point

of view, in the increased nutritive value of the whole mass of the flour made by this process."

Dr. Daughlish, whose paper descriptive of his process of making aerated bread was read before the Society of Arts, in reference to this method of unbranning states as follows:—

"The invention was brought under the notice of the French Emperor, who caused some experiments to be made in one of the French bakeries, to test its value. The experiments were perfectly satisfactory, so far as the making of the extra quantity of fine flour was concerned, but when this flour was subjected to the ordinary process of fermentation, and made into bread, much to the astonishment of the parties conducting the experiments, and of the inventor himself, the bread was brown instead of white. The consequence of course has been, that the invention has never been brought into practical operation. But about four years ago a French chemist, M. Mége Mourès, directed his attention to the subject of utilising, for the purpose of white bread-making, the nutritious substances ordinarily thrown away with the bran, and the results of his inquiries were communicated in a memoir to the Academy of Sciences, on the 9th June, 1856, and have since been reported on by MM. Dumas, Pelouze, Payen, Peligot, and Chevreul.

"These results explain most satisfactorily the cause of failure of the flour prepared by the American method to make white bread.

'Before the publication of M. Mourès' researches, the nutritious substance attached to the bran was considered by chemists to be a portion of the gluten of the grain, but it now proves not to be gluten at all, but chiefly a new nitrogenous body, analogous to gluten, which the discoverer has named 'cerealine,' with a portion of another well-known nitrogenous body—'vegetable caseine.'

"Among the properties of this body, cerealine, M. Mourès gives the following:—

"It is soluble in water, and insoluble in alcohol. It acts as a ferment on starch, dextrine, glucose, or grape sugar. It alters gluten extremely, and gives to the altered matter a brown colour. Its peculiar action, when brought into contact, in the process of fermentation, with the ordinary constituents of fine white flour, is the true cause of the dark-brown colour imparted to the bread made from flour in which the cerealine was retained.

"M. Mourès, having satisfied himself as to the properties of cerealine, adopted a method by which its peculiar action was neutralised, and then made bread by the ordinary process of fermentation, in which the whole of the bran contained in the internal coat of the grain was allowed to remain. The result was a loaf having merely an orange colour, but none of that dark-brown colour which always results when the bran contained in the internal coat of the grain is used in bread made by the ordinary method.

"In like manner, by my process, in which the fermentative changes are never allowed to take place, bread made from wheaten meal, from which only the coarse bran has been separated, is so free from the dark-brown colour that it is difficult to persuade people that it is made from wheaten meal at all."

Proceedings of Institutions.

WOLVERHAMPTON YOUNG MEN'S CHRISTIAN ASSOCIATION.—The fourth annual report says there was much cause for congratulation and thankfulness. During the past year Mr. Brittain, who has been so long connected with the Institute, has felt it his duty to resign his position as assistant-secretary, and the Committee feel it a pleasure to record their sense of the value of his services. The vacancy has been filled by the appointment of Mr. Butterworth, who was one of the earliest committeemen. In the Bible Class 56 young men have enrolled themselves as

members, 44 of whom are more or less regular in their attendance. Strangers have paid 133 visits. The total of general members for the past four years have been as follows:—1858, 175; 1859, 200; 1860, 285; 1861, 304. The reading-room has been largely attended. During the year public lectures were delivered by the Rev. A. Mursell, of Manchester; Mr. Thomas Cooper, of London; Rev. Dr. Brock, of London; Mr. E. Wheeler, the electrician, and Henry Vincent, Esq.; and though these lectures were of an attractive and instructive character, yet a serious loss was entailed by them, for whilst the attendance of the members was always large, yet the general public did not countenance them to the extent anticipated. The social tea-meetings have secured the presence of a large proportion of the members, and have proved a very pleasant medium of intercourse. Classes have been conducted for the study of the following subjects:—Animal physiology, structural botany, mathematics, arithmetic, shorthand, instrumental music, English grammar and composition, writing, and French. The gentlemen who have kindly conducted them have in every case been thoroughly competent, and the result has been not only the securing a large number of students, but great progress on the part of many of the students. The library has been considerably enlarged during the year, between 300 and 400 vols. having been added, and is still supplied with new works from Mudie's library. The circulation of books has been, in the twelve months, about 3,500. The first prize for the essays, written at the request of the recent conference of employers of labourers, has been awarded to a member of this Institute, Mr. J. Purslow, and the third prize was awarded to a member of an affiliated society at Westbromwich. In the latter part of the report for the preceding year, an appeal was made with the view of raising a sum that would pay off the debt, pay the expenses of furnishing and fitting-up the new premises, and make an addition to the library. This appeal was well responded to, and notwithstanding the depressed state of trade, the bazaar held for the purpose was highly successful. The bazaar account shows a net profit of £200 7s. 3d. The cash statement for the year shows that the expenditure has been £525 19s. 6d., and that there is a balance due to the treasurer of £3 18s. 6½d.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, September 19th, 1862.]

Dated 9th September, 1862.

2481. W. Hirst, Halifax—Imp. in machinery to be employed in the manufacture of paper or linen spool tubes, which machinery is also applicable for the manufacture of cartridge cases.
2482. J. Walker, Norwich—Imp. in the manufacture of oil presses.
2483. T. Fleitmann, Isenlohn, Prussia—Imp. in the manufacture of copper from copper ores.

Dated 10th September, 1862.

2485. J. Saunders, 7, Mordin-place, Lewisham-road, Kent—A new or improved railway break.
2487. J. Vigouroux, Nîmes—An inoxidable white metal suitable for making taps or cocks, and other useful articles.
2491. A. Rigg, jun., Chester—Imp. in apparatus for carrying and tipping coal and other minerals, and in steam brakes used therewith, and with other machinery.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2536. E. Astel, Paris—Imp. in urinary utensils, also applicable to fixed and portable commodes.—16th September, 1862.

[From Gazette, September 26th, 1862.]

Dated 19th May, 1862.

1516. T. Morris and R. Weare, Birmingham, and E. H. C. Monckton, Fineshade, Northamptonshire—Imp. in obtaining and applying light and heat by electricity.

Dated 23rd May, 1862.

1562. A. Samuelson, 28, Cornhill—Imp. in the working of hydrostatic presses, and in the apparatus employed therein.

Dated 29th July, 1862.

2154. D. B. Clark, Lower Folgooth, St. Ewe, Cornwall—Imp. in the manufacture of candles, and in apparatus employed therein.

Dated 7th August, 1862.

2211. A. Thiriez, Lille, France—A new machine for glossing and glazing all tereby fabrics.

Dated 11th August, 1862.

2244. J. Lancelott, Birmingham—Imp. in the manufacture of ornamental chains for sheet metal.

Dated 21st August, 1862.

2339. A. Boubee, Paris—Improved apparatus for casting or moulding glass and imitating precious stones or marbles.

Dated 27th August, 1862.

2371. G. Davies, 1, Searle-street, Lincoln's-inn—A machine for singeing woven fabrics of cotton, wool, or silk by means of gas or alcohol. (A com.)

Dated 29th August, 1862.

2401. W. Owen, Rotherham, Yorkshire—Imp in the manufacture of railway wheels and tyres, and in securing tyres to wheels.

Dated 30th August, 1862.

2410. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in coating or covering metallic surfaces with copper. (A com.)

Dated 1st September, 1862.

2412. J. G. N. Alleyne, Butterley Iron Works, Alfreton, Derbyshire, and Capt. J. Roberts, 3, Essex-court, Temple—Imp. in the manufacture of flanged wrought iron or steel plates, and of wrought iron beams and frames of a trough-shaped section, and in the apparatus employed for that purpose.

2418. E. G. Fitton, Ardwick, Lancashire—Imp. in machinery for winding yarn or thread on to bobbins or spools.

Dated 2nd September, 1862.

2425. J. Mosheimer, Manchester—Certain imp. in machinery for amalgamating gold and silver or the ores thereof.

Dated 4th September, 1862.

2448. H. L. Emery, Foulis-terrace, Brompton—Improved machinery for ginning cotton.

Dated 5th September, 1862.

2452. W. E. Bovill, 22, James-street, Buckingham-gate, Westminster—Imp. in the mode of applying oil and other fluid lubricating matters to machinery. (A com.)

Dated 8th September, 1862.

2471. J. Whitehead, David-street, Manchester—Certain imp. in looms for weaving.

2472. J. Hartshorn, Mansfield-road, Nottingham, and W. Redgate, Nottingham—Imp. in means or apparatus for the manufacture of lace fabrics.

Dated 9th September, 1862.

2473. C. Fink, Berlin, Prussia—An improved turbine.

2474. G. W. Belding, 7, King-street, Cheapside—Imp. in wringing machines. (A com.)

Dated 10th September, 1862.

2484. J. Saunders, 7, Mordin-place, Lewisham-road, Kent—Imp. in lamps.

2486. M. Smith, Heywood, Lancashire—Imp. in machinery for raising the nap on woven fabrics. (A com.)

2488. F. Hands and H. Holland, Birmingham—New or improved compositions for the manufacture of black ornaments, such as brooches, bracelets, ear-rings, and other ornaments usually made of jet, which said compositions may also be applied to the manufacture of various other articles.

2490. A. Barclay, Kilmarnock, Ayr, N.B.—Imp. in traction engines, and in apparatus for indicating the pressure of steam.

2492. G. T. Bousfield, Loughborough-park, Brixton, Surrey—Imp. in machinery used in the manufacture of files. (A com.)

2494. G. T. Bousfield, Loughborough-park, Brixton—Imp. in machinery for cutting files. (A com.)

Dated 11th September, 1862.

2496. T. Steel, Bradford—Imp. in treating soap suds or other saponaceous or oily matters.

2498. C. R. Humphrey, 69, Old-street, St. Lukes—Imp. in printing machinery.

2502. W. Clark, 53, Chancery-lane—Imp. in cigar and cigarette cases. (A com.)

2504. J. Thomson, Seafeld Works, Dundee—Imp. in the treatment of vegetable fibres with a view to their manufacture into textile fabrics.

2506. W. Richards, Birmingham—Imp. in fire-arms and cartridges.

2508. P. Ward, 2, Cloud's-hill-villas, St. George's, Bristol—Imp. in the manufacture of a double sulphide of calcium and sodium.

2510. A. Whytock, Lansdowne-terrace, Gloucester-road North, Regent's-park—Imp. in the construction of coated and uncoated sheet-iron boxes, and in the mode of, and apparatus for, straightening coated and uncoated sheet iron.

Dated 12th September, 1862.

2516. J. Rowell, Aberdeen, N.B.—Imp. in pillars and apparatus for straining wire.

2518. A. J. Moreau, Sherborne-street, Blandford-square—An improved mode of or process for reducing or melting pulverised metals or metallic ores.

Dated 13th September, 1862.

2522. H. J. Lewis, Birmingham—Imp. in engines to be worked by means of water.

2524. W. J. Williams, Arundel-street, Strand—Improved apparatus or machinery for punching, cutting, or pressing metal or other plates or substances, which said imps. are also applicable to tension rods.

2526. A. V. Newton, 66, Chancery-lane—An improved mode of and apparatus for sleeking, creasing, and raising leather. (A com.)

2528. W. Palmer, Sutton-street, Clerkenwell—Imp. in lamps, and in apparatus used therewith.

Dated 15th September, 1862.

2530. W. G. Rawbone, Birmingham—Imp. in gun barrels, and in machinery to be employed in effecting the said imp., and in tools and machinery for producing inscriptions, ornaments, and devices upon gun barrels, lock plates, and other metallic parts of small arms, and for producing inscriptions upon saws and articles of cutlery generally.

PATENTS SEALED.

[From Gazette, September 26th, 1862.]

September 26th.

- | | |
|---|---|
| 847. F. Tolhausen. | 940. G. Bower and J. Qualter. |
| 848. R. Edwards. | 942. G. Hunter. |
| 852. J. L. H. C. Comtesse de Verne de Corneillan. | 943. R. M. Toogood and J. Laybourne. |
| 854. R. De Bary. | 944. W. Kemp and T. Cowley. |
| 860. G. H. Birkbeck. | 946. D. Wilson. |
| 864. W. B. Nation. | 948. A. Mann. |
| 865. R. A. Owen. | 949. W. A. Richards. |
| 869. E. Smith. | 951. J. F. Woodall. |
| 872. J. Boucher. | 955. F. C. Bakewell. |
| 873. Y. Parfrey. | 979. B. Thompson. |
| 883. E. B. Hart. | 983. A. Harris. |
| 884. J. Platt and W. Richardson. | 1008. S. Farron. |
| 889. R. Young. | 1019. R. Theyson. |
| 891. W. Tyler. | 1029. L. Christoph, W. Hawksworth, & G. P. Harding. |
| 892. W. H. Hook. | 1031. J. Platt, W. Richardson, and W. Holland. |
| 894. W. B. Lord & F. H. Gilbert. | 1032. J. Petrie, jun. |
| 897. R. C. Ransome. | 1051. J. H. Johnson. |
| 901. J. M. Clements. | 1061. J. Park. |
| 906. P. R. Couchoud. | 1098. W. F. Lock. |
| 907. C. P. Gontard. | 1104. F. P. Warren. |
| 911. W. Turner. | 1111. J. Ashbury. |
| 917. E. Hartley, G. Little, and J. Hinchcliffe. | 1127. C. D. Abel. |
| 919. H. J. Madge. | 1155. S. P. Matthews. |
| 920. J. Platt and W. Richardson. | 1208. G. Richards. |
| 924. Rev. G. Scratton. | 1218. A. C. Kirk. |
| 925. S. Warren. | 1294. T. F. Griffiths. |
| 930. B. Blackburn. | 1601. J. F. Harrison. |
| 931. S. Hunter. | 1612. P. Boisset & B. Antognini. |
| 932. T. Moore. | 1668. J. J. H. Gebhardt. |
| 935. W. Leopold. | 1767. J. Lancelott. |
| 937. G. Rebours. | 1795. G. Haseltine. |
| 938. W. Helme. | 2161. H. White. |
| 939. R. Morton. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, September 30th, 1862.]

23rd September.

- | | |
|-------------------------------|----------------------|
| 2202. C. Stevens. | 2221. J. H. Johnson. |
| 25th September. | 2249. J. Rawlings. |
| 2188. P. J. Lejeune-Chaumont. | 27th September. |
| 26th September. | 2204. T. Allan. |
| 2184. C. Cowper. | 2235. E. Morewood. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, September 30th, 1862.]

22nd September.

- | | |
|-------------------|-------------------|
| 2129. J. Beattie. | 2168. J. Good. |
| 26th September. | 2175. J. Beattie. |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4510	Sept. 19	Corrugated Metallic Bristle Holder ...	{ George Russum ... John Russum ... }	46, Wade-lane, Leeds, Yorkshire.
4511	" "	{ A New combined Neck clamp and Lever Gallery for carrying and ad- justing the chimney glasses of lamps, and for regulating supply of air to the same ... }	Henry Coulter ...	Liverpool.
4512	" 24	A Match Holder ...	Samuel Needham ..	Oriel-place, College-street, Chelsea.

Journal of the Society of Arts.

FRIDAY, OCTOBER 10, 1862.

INTERNATIONAL EXHIBITION OF 1862.

DISTRIBUTION OF MEDALS AND AWARDS.

The following notice has been issued :—" His Royal Highness the Prince of Wales, being anxious to mark his deep interest in the success of the International Exhibition, an enterprise which owed its origin to his beloved father, has, with the approbation of her Majesty, graciously undertaken to distribute the Medals and Certificates of Honourable Mention, at a State Cereemonial early in the year 1863, after the building has been cleared."

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have

undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s. ; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

It was the intention of the Council to issue the volume complete in the early part of September, but as several of the Reports have not yet been received by Her Majesty's Commissioners, the completion of the entire work has been unexpectedly delayed; the Council, however, unwilling to defer the publication of the Reports already completed, have issued to the subscribers those that have been received up to the present time. When all the Reports are delivered, the parts now issued to subscribers will be exchanged, if uninjured, for the perfect volume, bound or unbound, as desired. Individual reports are sold separately; for prices see advertisement.

INTERNATIONAL EXHIBITION OF 1862.—VISITS OF SCHOOLS.

The following is a continuation of the Schools reported to Her Majesty's Commissioners as having entered the Building, from the 29th September to 2nd of October, 1862 :—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Sept. 29	Harlaston, Lincolnshire	Choir... ..	Rev. G. E. Norris	15	70
" "	Clapton, N. E.	St. John's Foundation	Committee..	55	
" 30	Westminster-road	Asylum for Female Orphans	Mrs. John Burnett	39	
" "	Sloane-street, Chelsea	Industrial Home	Subscription	47	
" "	Tottenham	Bruce Castle	A. Hall, Esq.	26	
" "	Brixton-oval	Bedford House	The Principal	8	
" "	Aldham Rectory	Charity	Rev. C. Bannatyne	24	
" "	Margate	Holy Trinity Church	Committee	40	
" "	Cromhall, Gloucester.	Earl Ducie's (Middle)	Subscription	15	
" "	Margate	St. John's	Subscription	60	
" "	Hendon	Mill Hill, Grammar	Rev. Dr. Hurndall	35	330
" "	Chessington, Surrey...	National	G. W. Clark, Esq.	36	
Oct. 1	City of London	Tower Ward	Committee	61	
" "	Old Gravel-lane	Wesleyan Day	Messrs. J. Lidgett & Son ..	85	
" "	Tanridge Court, Surrey	Oxstead, Sunday	Lady Melville	21	
" "	Rotherhithe	National	Rev. E. Blick	19	
" "	Kelvedon, Suffolk	Feering House	Mrs. Beardwell... ..	6	
" "	Wokingham, Berks...	National	Subscription	24	
" 2	Borough-road	{ British and Foreign School, So- ciety's Training College (Male) Students }	Samuel Gurney, Esq., M.P.	94	216
" "	Stockwell	{ British and Foreign School, So- ciety's Training College (Female) Students }	Henry E. Gurney, Esq. ...	92	

RETURN OF SCHOOLS (Continued).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
" "	Deptford	St. John's (Teachers)	The Managers	19	
" "	City of London	St. Sepulchre's	J. Holby, Esq.	30	
" "	Kennington	Bolton-street	Individual Subscription	10	
" "	Anerley	Surrey, North	Mrs. Vignoles	7	
" "	Stockwell-green	British	Mr. Goodchild	10	
" "	London	St. Giles's National	Rev. A. Thorold	255	
" "	Covent-garden	St. Paul's	Mr. Howard	17	
" "	Lambeth	St. Andrew's, National	Subscription	161	
" "	{ St. George's-road, Southwark }	King Edward's	The Governors	21	
" "	Wimbledon, Surrey	Sunday	Subscription	50	
" "	Lewisham, Kent	St. Mary's	Subscription	30	
" "	Hampstead	Haverstock Sunday	Rev. E. Diver	10	
					806

VISITS OF WORKMEN.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building from 26th September to October 2, 1862 :—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
Sept. 25	Agricultural Labourers	{ Grove-hill Farm, Tinge-wick, Bucks }	H. P. Greaves	20
" 29	Farm Labourers	Oldfield, Oxon	Mr. Wm. Treadwell	16
" "	Agricultural Labourers	{ Burton, Latimore, Northamptonshire }	John Walker, Esq.	14
" "	Employés	{ Mustard, Starch, and Blue Works, London and Norwich }	Messrs. J. and J. Colman	500
" "	Glue and Size Makers	Bermondsey	Proctor and Bevington	107
" 30	Farm Labourers	{ Broughton House, Northamptonshire }	Duke of Buccleuch	50
" "	Brewers' Employés	Romford, Essex	Ind and Coope	450
Oct. 1	{ 5th Company 4th City Rifle Volunteers }	City of London	Captain H. T. Swatton	20
" "	{ Engineers and Agricultural Implements Makers }	Reading, Berks	{ Messrs. Barrett, Exall, and Andrews }	500
" 2	Ship Builders' Apprentices	Southampton	John Ransome	47
" 3	Brewers	Stanmore, Middlesex	T. Clutterbuck	14
" "	{ Inmates of Shoreditch New Alms-houses }	Haggerstone	C. S. Butler, Esq., M.P.	19

CONVERSAZIONE.

The third *Conversazione* of the season took place at the South Kensington Museum on Wednesday evening, the 8th instant. There were upwards of 3,000 persons present, including some of Her Majesty's Commissioners for the Exhibition of 1862, Foreign Ministers and Commissioners, Jurors, and others connected with the Exhibition. The company was received by Sir Wentworth Dilke, Bart., Vice-president, and other members of the Council. The bands of the First Life Guards and of the Coldstream Guards were in attendance.

ON ARTIFICIAL STONES.

By PROFESSOR D. T. ANSTED, M.A., F.R.S.

The following paper was read in Section G at the Cambridge Meeting of the British Association :—

The various compositions that have been invented from time to time to replace natural stone, by substances

cheaper, more convenient, or more durable than any that can readily be obtained on the spot where the stone is required, are so numerous that it would be impossible merely to name them without occupying much time; and a mere enumeration could have little or no interest. My object in the present communication is to direct the attention of the section to the different classes of material that have been found available; to point out the principles involved in each, and the special advantage and disadvantage each possesses, to refer to a new and I believe an important material, and to suggest the bearing of the whole subject on that of the preservation of stone from decay. Having for several years, and especially during and since the Exhibition of 1851, taken great interest in the subject of constructive material and the preservation of stone, and having lately been one of a committee of inquiry concerning the state of the stone of the Palace at Westminster, I have learnt from experience how little the whole subject is understood, how vague are the notions of intelligent practical men—builders as well as architects—and how difficult, if not impossible, it is for architects, engineers and builders to determine, by any series of experiments lasting only for a short time, whether a method proposed is likely to have any practical value when applied on a large scale.

The artificial stones hitherto used may be grouped

under one of three heads—they are either (1) *terra cotta*, or manufactures of plastic clay burnt in a kiln; (2) *cements*, manufactured from a certain kind of limestone containing foreign ingredients of such a nature that when converted into lime by burning, the lime thus made possesses the property of setting very rapidly and firmly when wetted; (3) *siliceous stone*, obtained by burning in a kiln sand and other substances moulded with a solution of silicate of soda, which is converted into a kind of glass firmly connecting the particles. I omit *plasters*, as rarely exposed to the weather.

Terra cotta.—The advantages of this material are (1) its cheapness and the abundance and the universal distribution of the clays of which it can be made; (2) the facility with which it can be moulded to any required form; and (3) the pleasant colour of the material when uninjured by long exposure to weather. The work recently executed at the Horticultural Gardens at South Kensington, is a favourable specimen. The disadvantages of *terra cotta* are (1) the uncertainty of the result, owing to the great and unequal contraction of all clays in burning; (2) its want of power to resist damp and frost whenever there is the slightest flaw, whether produced before or after burning; (3) its brittleness and want of strength; (4) its exposure to a disagreeable green vegetation in damp air after a few years weathering. *Terra cottas* are better adapted to a dry than a moist climate.

Cement.—Whether of the kind called *Puzzolana*, *Roman*, or *Parker's*, or *Atkinson's*, or any modification of these,—all the cements are similar in their nature. The advantages of cement used as an artificial stone are (1) its cheapness where made, and its ready transport; (2) its not requiring the kiln, but setting at once without contraction; (3) the facility of moulding and making up the material from the manufactured cement supplied; (4) its great strength when well made. The disadvantages are (1) that it cracks and peels badly when exposed to frost and damp air; (2) that it is very irregular, some samples yielding a much harder, better, and more lasting stone than others, without apparent reason; (3) that it is subject to a green vegetation, like *terra cotta*. These disadvantages do not all apply to its use in making concrete, for which it is admirably adapted.

Siliceous Stone.—This is manufactured under a patent by Mr. Ransome. It attracted attention at the Exhibition of 1851, and has since been much used. Its advantages are: (1) the extreme uniformity of its texture; (2) the almost entire absence of contraction, and its freedom from cracks and flaws produced during burning; (3) its complete resistance to all kinds of weathering, to which may be added (4) its pleasing colour and tint.

On the other hand, among the disadvantages are (1) its cost, which is greater than for either of the other kinds of artificial stone; (2) its being subject to a white efflorescence of salt and a green stain from damp, both of which take away from its value for ornamental purposes, for which it is otherwise admirably adapted.

The mechanical and chemical principles involved in these different contrivances are as follows: in *terra cotta* the material is a kind of clay purer and more free from foreign substances than common clay, and mixed with dust from pottery already made. The manufactured article is thus a superior fire brick. The burning produces little chemical change or metamorphosis, but the condition after burning is so far different that ordinary exposure will not bring back the original texture of clay. Of closer texture than brick, there is less absorption from the surface; but in ornamental work there are always flaws enough to render frost following rain dangerous and injurious. In other respects the material itself is little more liable than brick to injury from exposure.

In cement the raw material is carbonate of lime, with a certain but variable proportion of foreign substances, of which clay or silicate of alumina is an important and even an essential part. All the varieties of cement stone, such as the stones called *septaria* and other nodules, in the

London clay at Harwich, or the *Kimmeridge* clay in Dorsetshire, or the *Lias* in the Midland Counties and the north, or the mud of the *Medway* and *Thames*, agree in this. On burning this material the limestone is converted into lime, and the condition and proportion of the foreign material determines the value of the resulting cement. It is called *hydraulic cement*, as setting with almost any required rapidity when properly mixed with water, and this in damp air, during rainy weather, and even under water, absorbing no more water than is necessary for consolidation. Under various names, *pozzuolana*, *Roman cement*, *Parker's cement*, *Atkinson's cement*, &c., this valuable material has been used from time immemorial, and is especially adapted for making concrete where a large proportion of foreign substances is introduced. As an artificial stone, although it hardens on exposure, its composition is too irregular to justify a very extended use. In the process of setting, the lime first mixes with water and becomes hydrate of lime, and is then rapidly converted into silicate of lime, adhering strongly in thin films to itself and to foreign bodies with which it is in contact.

The siliceous stone of Mr. Ransome consists of sand and foreign substances, worked up into a paste with the fluid silicate of soda. If left to dry in the air it would fall to powder, but being exposed to a high heat in a kiln a chemical action takes place. The alkali of the silicate of soda "combines with an additional quantity of silica supplied by the sand, &c., with which it is incorporated, and becomes converted into an insoluble glass, firmly agglutinating all the various particles together into a solid compact substance." No sensible contraction takes place in burning, and cracks rarely occur.

The resistance to weather offered by these three kinds of artificial stone may be thus stated:—1. *Terra cotta*, contracting irregularly in the kiln, is subject to cracks and flaws, into which water penetrating and expanding during frost, a peeling and splitting of the material naturally follows. It is almost certain, from the nature of the case, that delicate and ornamental work should be more liable to such injury than straight work and plain surfaces. 2. *Cement*, owing to the want of homogeneity in the raw material, is also very subject to flaws and cracks, and is injured by damp and frost like *terra cotta*. Both *terra cotta* and cement require painting in London and elsewhere. 3. The siliceous stone is rarely flawed in the kiln, but even if it is, the stone does not crack, or the surface peel by exposure to damp and frost, owing to the nature of the cement, which is, in fact, glass. It is also worthy of remark, that this material obtains its greatest hardness before it leaves the kiln, whereas cement gradually hardens, and continues to harden for many years if it be not destroyed before the induration is sufficiently advanced.

During experiments made in the laboratory on various methods suggested for preserving stone by a section of the committee recently appointed by the Board of Works in reference to the palace at Westminster, Dr. Hoffman, Dr. Frankland, Mr. Abel, and myself being members of this sub-committee, a very remarkable material was submitted by Mr. Ransome and experimented on to some extent.

Dr. Frankland has since reported on this material. Its discovery arose out of the application of Mr. Ransome's method of preserving stone by effecting a deposit of silicate of lime within the substance of absorbent stones:—Mr. Ransome saturating the surface with a solution of silicate of soda, and then applying a solution of chloride of calcium, thus producing a rapid double decomposition, leaving an insoluble silicate of lime within the stone, and a soluble chloride of sodium (or common salt), which could afterwards be removed by washing. To prove that by this process a coating of hard silicate of lime was actually formed and deposited, as according to his theory it must be, Mr. Ransome made small blocks of various forms, in moulds, by mixing loose sand with the fluid silicate of soda, and then dipping the mould into the chloride of calcium. To the surprise probably at first of Mr. Ran-

some himself, but certainly of the chemists of the sub-committee, who performed the experiment in the absence of the inventor, there came out almost instantaneously a perfectly compact, hard, and to all appearance a perfectly durable solid. In such solids, at least, there seems to be no element of destruction.

It was evident that such a result could not be without consequences. So far as it bore upon the inquiry of the committee, it is alluded to in their published report. Many considerations connected with the nature and condition of natural stones liable to destruction by weathering prevent an absolute decision without much previous experience. Mr. Ransome, however, immediately patented his "concrete stone," and as an artificial stone it deserves to be well known and thoroughly considered. It promises indeed to combine the advantages, and seems to show none of the disadvantages, of other artificial stones. It is cheap, being made of almost any rubbish on the spot where it is required, by the aid of materials neither costly nor difficult to convey. It is made with rapidity, and is ready for use without drying or burning. It hardly requires even a temporary shed for the purposes of manufacture, and may be made of any size, and moulded into any form. So far as can be detected, it is subject to no injury from weather, and becomes, in fact, if made with sand, a true sandstone, cemented by silicate of lime, than which there is no better natural material. No doubt it will be necessary to watch carefully for a few years the behaviour of a silicate of lime thus deposited, but if it endure that test there can be no doubt that it will then improve by time, increased age only hardening all known silicates of lime, especially those formed from lime used as mortar or cement.

In the application of this subject to the preservation of stone, there seems a probability that some valuable result will follow from the suggestion of Mr. Ransome, to effect the deposit of an insoluble silicate within the pores of an absorbent stone by double decomposition. The objection, strongly felt, that the material thus deposited would probably be in the form of unconnected grains, rather than a cementing film, seems answered by the formation of a stone so solid as the specimens show; and although it is unlikely that any contrivance can render absolutely permanent a stone that has once advanced far in decay, it will be a great step gained if poor and doubtful stones can be rendered almost indestructible before being placed in a building and exposed to danger.

So far as artificial stone is concerned, Mr. Ransome's material, if it really shows no unexpected weakness, will answer all requirements. It has been tried on a somewhat large scale in the bed of a steam engine, weighing two tons, in the International Exhibition, and again in the new stations recently erected for the Metropolitan Railway. Smaller specimens are very satisfactory. It seems to combine cheapness with durability and resistance to weathering to an extent hitherto unknown.

I append the following results of experiments recently made, and communicated to me by Mr. Ransome:—

Compared with Portland and Caen, a bar of the concrete stone, the section being 4 inches square and length 8 inches between the supports, sustained 2,122 lbs. suspended midway between the supports; while Portland and Caen broke at 750 and 780 lbs.

The adhesion of the stone is shown by weight suspended from a piece prepared to express a sectional area of $5\frac{1}{2}$ " Caen stone separated at 768; Bath at 796; Portland at 1,104; Elland edge at 1,874; and Ransome 1,980 lbs.

A cube of 4" sustains 20 tons.

UNSINKABLE SHIPS.

By CHARLES ALBERTON, LATE CHIEF ENGINEER IN WOOLWICH DOCKYARD.

The following paper was read in Section G., at the Cambridge Meeting of the British Association:—

Competitive rivalry in the arts of naval construction and Ordnance destruction, as applied to maritime warfare,

having now, as appears by recent demonstrations at Shoeburyness, reached a condition of experimental speculation prospectively of an unlimited character; and as the consideration of this subject essentially embraces the question of the capability of an invulnerably armoured ship to carry armament with reference to the size of the ship itself, it is presumed that a paper thus involving the details of Naval architectural construction may be appropriately brought forward and discussed in the Mechanical Section of the British Association for the Advancement of Science.

The object of this communication is not to discuss the question—Whether, by an unlimited expenditure, ships can be made invulnerable to the assaults of all present and future ordnance, nor is it intended to damp the ardour with which peace must be upheld by the moral effect of preparation for any adverse eventuality by our practically adopting, for the time being, in common with other nations, the recognised principle of "invulnerability." My object on the present occasion is simply to bring forward the question, whether the principle of "Unsinkability" as based on the average specific gravity of the materials of which a ship may be constructed and loaded being less than the specific gravity of water, and as distinguished from "invulnerability" as dependent on armour plating, may not be advantageously introduced as supplementary to our present system of naval construction.

This subject has for some years engaged my attention, and in anticipation not only of the now-realised efficacy of direct fire, but also in anticipation of a totally new era of mortar practice not yet entered upon, whereby the decks of vessels may undoubtedly be assailed by the descent upon them of a huge weight (say 10 tons), projected to a great height (say 300 feet) at short range (say 100 yards), thereby attaining precision of descent, and falling almost vertically on the deck, and passing out through the bottom of an adjacent ship. Anticipating such results, I have already, by various publications, and officially in my late capacity as Chief Engineer of Woolwich Dockyard, directed attention to the principle of "Unsinkable Ships," as a means of obviating the fatal effects at sea of such devices, and I now beg reference to the following letter which appeared in *The Times*, of 12th January, 1859, explaining generally, though incompletely, the views which I entertain:—

TO THE EDITOR OF THE "TIMES."

SIR,—Many suggestions have of late been brought before the public on the construction of gunboats, mortar-boats, and floating-batteries, with a view to make them invulnerable; and I now beg to add my views on that subject. Why not make the floating body for such special services, up to the line of its load displacement, a solid mass of material of such specific gravity lighter than water that it shall not sink, however much it may be perforated by shot? It appears to me that a solid combination might be made of cork shavings, light wood sawdust, rush stems, cotton waste, flocks, hemp, and other light material, which, by the aid of a solution of gutta percha, or other chemical process, would form a solidifying mass, so tough that it could not be knocked to pieces by shot, and so light that it would be only one-half the specific gravity of water, and therefore unsinkable, however perforated by shot, and capable of carrying armament and naval equipment to the extent of nearly one-half the weight of its own displacement in tons. Such vessels of light draught accompanying fleets of war as tenders to line-of-battle-ships, whence they might be manned and stored as occasion might require, would, I submit, form a useful auxiliary available for shore service, or for attacking land batteries, which deep draught ships of the line cannot approach, and would be sunk if they could.

I may observe that this idea was first broached by me two years since as being applicable to the construction of vessels for carrying treasure. They might be wrecked ashore, but the treasure would be recoverable.

I am, Sir,
Your very obedient servant,
CHARLES ALBERTON,

Woolwich Dockyard, January 10th, 1859.

In respect to the practical carrying out of the general principle of "unsinkability," announced in the foregoing letter, I beg further to explain that I do not anticipate depriving war of the glory and honour which can only be purchased by blood. Without the sacrifice of blood in war the naval and military calling would be ignominious and the national spirit would become degenerate; no, let ordnance do its best. I would, however, seek in the construction of "unsinkable ships" that the life of a man may not be sacrificed by an ounce of lead, and that the whole crew of a ship may not be simultaneously drowned through the effective application of a single shot, or the descent of a single thunderbolt down through the deck and bottom of the ship, or by the lateral concussion of a hostile ram. With these views I always anticipated that the principle of "unsinkability" would, if adopted, be carried out, not exclusively by making the ship solid up to her load line, but on various plans of arranging and disposing of the buoyant material according to the special requirements of the service contemplated, for example, a treasure ship or ship built for being laden with specially valuable goods may, if so preferred, be a mass of buoyant material up to its load line. But a steam-ship may be constructed with its engine-room below the level of the load line, into this the water may possibly get access, but the ship when thus water-logged would be saved from going to the bottom by a sufficiency of buoyant material being constructively disposed of in various parts of the ship, such, for instance, as the hull and decks above the load water line being composed of as great a mass of material as is equivalent to the entire capacity of hold in space left vacant below the load water line.

Of course the efficacy of this system would be entirely dependent on the degree in which the specific gravity of the buoyant material may be less than the specific gravity of water. Various communications have already been made to me announcing the discovery of natural substances and artificial compounds not exceeding half the specific gravity of water, and apparently suitable for being used as a buoyant material in the construction of unsinkable ships on the principles thus set forth. The practical prosecution of the subject is so obvious, and the details of arrangements manifestly so adequate to the special objects for which a ship may be intended, that I need not, on the present occasion, encumber this promulgation of my views by entering into details. I would merely further observe that the mass of buoyant material may be so selected and disposed of that it may contribute greatly to the strength of the ship. Of course, in the practical adoption of this principle, as compared with the ordinary construction of ships, there must be a sacrifice of capability, but when it is considered that the great mass of buoyant material may be distributed below the water line, and thus conduce to the stability of the ship instead of being above the water line and thus impairing the stability of the ship, as is necessarily the case with the armour plating of invulnerable ships, and, moreover, when it is considered that the principle of unsinkability is applicable to vessels of small size, whilst invulnerability by iron armour plating can only be carried out with vessels of enormous magnitude, it may be confidently anticipated that the principle of unsinkability by the agency of buoyant materials, as distinguished from the principle of invulnerability by the agency of armour plating, is worthy of attention for mercantile purposes, especially in time of war, and as a supplementary adjunct for co-operating with ships of war in shoal waters where armoured ships, by reason of their necessarily great draft, cannot operate. In prosecuting the operations of war, ordinary ships, defended by unsinkable ships or otherwise kept out of harm's way, would be available as barracks, hospitals, and store ships for their accompanying fleet of unsinkable ships, of which the stowage for stores may be deficient.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE,

The following papers were read in the various sections:—

ON THURSDAY, OCTOBER, 2, 1862.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

C. Tomlinson—On the Motion of Camphor, &c., towards the Light.

Isaac Ashe—Suggestions on Balloon Navigation.

J. P. Gassiot—Extract from an Account of a Visit to the Kew Observatory, presented to the Portuguese Government by Prof. J. A. de Souza, Professor in the University of Coimbra.

James Nasmyth—On some peculiar Features in the Structure of the Sun's Surface.

Rev. Prof. Challis—On the Extent of the Earth's Atmosphere.

Rev. Prof. Challis—On the Augmentation of the Apparent Diameter of a Body by its Atmospheric Refraction.

Wm. Spottiswoode—On the Hindu Method of Calculating Eclipses.

J. M. Menzies—Description of an Optical Instrument which Indicates the relative Change of Position of two Objects which are maintaining Independent Courses.

G. J. Symons—On British Rainfall during 1860 and 1861.

G. J. Symons—On the Performance, under trying circumstances, of a very small Aneroid Barometer.

Norman Pogson—Observations on three of the Minor Planets in 1860.

Dr. J. Croll—On the Mechanical Power of Electro-Magnetism, with special reference to Dr. Joule and Dr. Scoresby's Theory.

SECTION B.—CHEMICAL SCIENCE.

An Address was delivered by the President.

T. Moffatt, M.D., F.G.S.—On the Luminosity of Phosphorus.

Thomas Sutton, B.A.—Description of a rapid Dry Collodion Process.

E. J. Lowe, F.R.A.S.—Remarks on Ozone.

J. H. Gladstone, Ph. D., F.R.S.—On the Essential Oil of Bay and other Aromatic Oils.

Dr. T. L. Phipson—On the existence of Aniline in certain Fungi, which become blue in contact with the Air.

Dr. T. L. Phipson—On the Artificial Formation of Populine, and on a new class of Organic Compounds.

Dr. T. L. Phipson—Analysis of the Diluvial Soil of Brabant, &c., known as the Liman de la Hesbaye.

SECTION C.—GEOLOGY.

The President—Opening Address.

H. Seely, F.G.S.—On a Whittled Bone, from the Barnwell gravel.

J. Crompton.—On a deep Well at Norwich.

Prof. Ansted, F.R.S.—On a Tertiary Bituminous Coal in Transylvania, with some notice on the Brown Coals of the Danube.

R. A. C. Godwin Austen, F.R.S.—On the Alluvial Deposits of the Rhine.

J. Gwyn Jeffreys, F.R.S.—On an ancient Sea Beach and Bed at Fort William.

SECTION D.—ZOOLOGY AND BOTANY, INCLUDING PHYSIOLOGY.

The President—Introductory Address.

John Gibbs—On the Inflorescence of Plants.

John Lubbock, F.R.S.—On two Aquatic Species of Hymenoptera, one of which swims with its wings.

J. Gwyn Jeffreys, F.R.S.—Exhibition of a specimen of *Astarte compressa*, having its hinge teeth reversed.

W. Lauder Lindsay, M.D., F.R.S., Edinburgh—On the Foot-poison of New Zealand.

The Rev. Wm. N. Molesworth, M.A.—On the Influence of the Conditions of Existence in modifying the characters of Species and Varieties.

SUB-SECTION D.¹—PHYSIOLOGY.

George Robinson, M.D.—On the Study of the Circulation of the Blood.

Charles Kidd, M.D.—On Simple Syncope as a coincidence in chloroform accidents.

George D. Gibb, M.D.—On the Physiological Effects of the Bromide of Ammonium.

John Davy, M.D., F.R.S.—Observations on the Earth Worm.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

Capt. Richard Burton, H.M., Consul at Fernando Po.—Ascent of the Cameroons Mountains, West Africa.

J. Crawford, Esq., F.R.S.—On Colour as a Test of the Races of Man.

Dr. Livingstone, communicated by the Rev. William Monk—Letter from Eastern Africa.

Rev. H. C. Scudamore, communicated by the same—On the Proceedings of the United University Mission.

Rev. Mr. Stewart—Voyage on the Lake Nyassa, Eastern Africa.

Major Walker—On the Trans-Indus Frontier of British India.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

President's Address.

Rev. Vernon Harcourt, M.A.—Report of the Committee on Technical and Scientific Evidence in Courts of Law.

Charles M. Willich—On Expectation of Life.

Rev. George Fisher, M.A., F.R.S.—On the Numerical Mode of Estimating Educational Qualifications, as pursued at the Greenwich Hospital School.

SECTION G.—MECHANICAL SCIENCE.

President's Address.

James Nasmyth—On an Improved form of "Link" Motion.

Edward E. Allen—On the Importance of Economising Fuel in Iron-plated Ships.

Dr. Filippo Grimaldi—A New Marine Boiler.

Wm. Thorold—On the Failure of the Sluice in the Fens, and on the Means of securing such Sluices against a similar contingency.

J. Coryton—A vertical Wave-line system of Ship construction.

J. Coryton—Oblique system Self-reefing Sails.

J. Coryton—Atmospheric Guide Propeller.

In the evening Prof. Tyndall delivered, in the Guildhall, his discourse "On the Forms and Action of Water."

FRIDAY, OCTOBER, 3, 1862.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

Fleeming Jenkin—Provisional Report on a proposed standard of Electrical Resistance.

Fleeming Jenkin—Provisional Report on Thermoelectric Currents in circuits of one metal.

Arthur Cayley—Report on certain Dynamical Problems.

Arthur Cayley—On a certain Curve of the fourth Order.

Arthur Cayley—On the Representation of a Curve in Space, by means of a Cone and Monoid Surface.

Rev. R. Harley—On a certain class of Linear Differential Equations.

W. H. L. Russell—Some Account of recent Discoveries made in the Calculus of Symbols.

T. L. Plant—On Meteorology, with a Description of new Meteorological Instruments.

Rev. Dr. Booth—On an Instrument for describing Geometrical Curves, invented by Henry Johnson.

G. R. Birt—On three new Craters in the Moon not in Beer and Mädler's Map.

Rev. R. Main—Observed R.A. and N.P.D. of Comet II., 1862.

Rev. R. Main—On the Dimensions and Ellipticity of Mars.

Rev. Prof. Challis—On the Zodiacal Light, and Shooting Stars.

Rev. Prof. Selwyn—On Autographs of the Sun.

SECTION B.—CHEMICAL SCIENCE.

G. B. Buckton, F.R.S.—Notes on the Decomposition of the Organo-Metallic Radicles.

J. P. Gassiot, F.R.S.—On the Mode of Preparing Carbonic Acid Vacua.

William Odling, M.B., F.R.S.—On the Synthesis of some Hydro-Carbons.

Monsieur A. Des Cloizeaux—Modification temporaire et permanente apportée par la chaleur à certaines propriétés optiques du feldspath orthose, de la cymophane et de la Brookite.

W. H. Harris—On the Adulteration of Linseed Cake with Nut Cake.

SECTION C.—GEOLOGY.

W. Boyd-Dawkins—On the Wokey Hole Hyæna-den.
Dr. Daubeny, F.R.S.—On the last Eruption of Vesuvius.

W. T. Blanford, F.G.S.—On an Extinct Volcano in Upper Burma.

H. C. Sorby, F.R.S.—On the comparative Structure of Artificial and Natural Igneous Rocks.

Prof. Harkness, F.R.S.—On the Skiddaw Slate Series.

Charles Moore, F.G.S.—Contributions to Australian Mesozoic Geology.

Wm. Pengelly, F.G.S.—On the Co-relation of the Slates and Limestones of Devon and Cornwall with the Old Red Sandstone of Scotland.

SECTION D.—ZOOLOGY AND BOTANY, INCLUDING PHYSIOLOGY.

James Buckman—Experiments with the Seed of mal formed Roots, and on the enobling of Roots, with particular reference to the Parsnip.

James Samuelson—Recent Experiments on Heterogenesis, or Spontaneous Generation.

Richard Owen, D.C.L., F.R.S.—On the zoological significance of the Brain and Limb characters of Man: with remarks on the Cast of the Brain of the Gorilla.

Richard Owen, D.C.L., F.R.S.—On the homologies of the bones of the head of the *Polypterus niloticus*.

Richard Owen, D.C.L., F.R.S.—On the characters of the Aye-aye, as a test of the Lamarckian and Darwinian, hypothesis of the Transmutation and origin of Species.

A. D. Barlett—Observations of the habits of the Aye-aye living in the Gardens of the Zoological Society Regent's Park, London.

Dr. Cleland—On Ribs and Transverse Processes, with Special Relation to the Theory of the Vertebrate Skeleton.

Professor Allman—On the Structure of Corymophora.

SUBSECTION D.¹—PHYSIOLOGY.

T. Spencer Cobbold, M.D., F.L.S.—On all the Known Forms of Human Entozoa.

Edward Smith, M.D., F.R.S.—Tobacco smoking: its Effect upon the Pulsation.

John Davy, M.D., F.R.S.—On the Question whether Arsenic taken for lengthened periods in very minute quantities is injurious.

Professor Harley, M.D.—On Secret Poisoning.

Professor Rolleston, M.D., F.R.S.—On the Difference of behaviour exhibited by Inuline and ordinary Starch when treated with Salivary Diastase and other converting agents.

J. W. Osborne—Observations made at Sea on the Motions of Vessels, with Reference to their Effects in producing Sea Sickness.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

Professor Ansted, F.R.S.—On the climate of Guernsey.

Commander Mayne—On Vancouver's Island.

John Bailey, Esq.—An account of the Veddahs of Ceylon.

Dr. Beke—A Journey to Harran in Padan Aram, and thence over Mount Gilead into the Promised Land.

Rev. G. Prout—Ascent of Um Shaumur, in the Peninsula of Sinai.

John Rochfort.—The Middle Islands of New Zealand.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

Henry Fawcett, M.A.—On the Economic Effects of recent Gold Discoveries.

Frederick Purdy—On Local Taxation and Real Property.

W. T. Thornton—On the Income Tax.

Richard Valpy—The Tariffs and Trades of various Countries during the last Ten Years.

Dr. Watts—On the Practicability of a Division of the Employer's Profits amongst the Work-people.

SECTION G.—MECHANICAL SCIENCE.

James Oldham—Report on Tidal Observations in the Humber.

R. W. Woolcombe—On Oblate Projectiles with Cycloidal Rotation, contrasted with Cylindro-Ogival Projectiles having Helical or Rifle Rotation.

Professor D. T. Ansted, M.A., F.R.S.—On Artificial Stones.

G. B. Airy, M.A., F.R.S., Astronomer Royal—On the strains in the Interior of Beams and Tubular Bridges.

P. Le Neve Foster, M.A.—On Machinery for Composing and Distributing Type. A communication from Charles Hart.

Captain J. Steuart, R.N.—On a proposed New Arrangement of Ships' Rudders.

In the evening a *Conversazione* with experiments was held at the Guildhall.

SATURDAY, OCTOBER 4, 1862.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

Rev. Dr. Lloyd—Report of a Committee to Inquire into the adequacy of existing Data for carrying into Effect the Suggestion of Gauss to apply his general Theory of Magnetism to Magnetic Variations.

F. J. Evans—Report on the Three Reports of the Liverpool Compass Committee.

Professor Stokes—Report on Double Refraction.

M. A. Des Cloizeaux—Relation entre les phénomènes de la polarization rotatoire et les formes hemiedres ou hemimorphes des cristaux à un ou à deux axes optiques.

Professor Hennessy—On some of the Characteristic Differences between the Configuration of the Surfaces of the Earth and Moon.

E. Esselbach—On an Experimental Determination of the Absolute quantity of Electric charge.

Isaac Ashe, A.B., M.B., T.C.D.—On some Improvements in the Barometer.

John Ball—On the Determination of Heights by means of the Barometer.

T. A. Hirst—On the Volumes of Pedal Services.

William Ogilby—On the Eccentricity of the Earth and the Method of finding the Co-ordinates of its centre of Gravity.

SECTION B.—CHEMICAL SCIENCE.

J. W. Osborne—On a Photolithographic Process adopted by the Government of Victoria for the publication of Maps.

G. C. Foster, F.C.S.—On the Principles upon which Atomic Weights should be determined.

W. Odling, M.B., F.R.S.—On the Nomenclature of Organic Compounds.

G. Harley, M.D.—On Schöbein's Antozone.

D. Campbell, F.C.S.—On the Action of Nitric Acid upon Pyrophosphate of Magnesia.

SECTION C.—GEOLOGY.

Dr. L. W. Lindsay—On the Gold-fields of Auckland, New Zealand.

Dr. L. W. Lindsay—On the Gold-fields of Otago, New Zealand.

Professor Owen, F.R.S.—Exhibited and described the Tooth of a *Mastodon*, from Tertiary Marls, near Shanghai, China.

H. C. Sorby, F.R.S.—On the Cause of the Difference in the state of preservation of different kinds of Fossil Shells.

J. W. Salter, F.G.S.—On the Identity of the Upper Old Red Sandstone with the Uppermost Devonian (the Marwood beds of Murchison and Sedgwick), and of the Middle and Lower Old Red with the Middle and Lower Devonian.

S. P. Saville—Exhibited a Skull of the *Rhinoceros tichorhinus*.

SECTION D.—ZOOLOGY AND BOTANY INCLUDING PHYSIOLOGY.

Section D did not meet on Saturday, on account of the Excursion to Hunstanton.

SUB-SECTION D¹.—PHYSIOLOGY.

Isaac Ashe, A.B., M.B., T.C.D.—On the Function of the Auricular Appendix of the Heart.

Isaac Ashe, A.B., M.B., T.C.D.—On the Functions of the Oblique Muscles of the Orbit.

G. D. Gibb, M.D.—On the Normal Position of the Epiglottis as determined by the Laryngoscope.

James Dowie—Remarks on the Loss of Muscular Power, arising from the ordinary Foot-clothing now worn, and on the means required to obviate this loss.

Professor Beale, M.B., F.R.S.—An attempt to show that every living structure consists of matter which is the seat of Vital Actions, and matter in which Physical and Chemical changes alone take place.

Henry Freke, A.B., M.B., T.C.D.—A Tabular View of the Relation which subsists between the Three Kingdoms of Nature with regard to Organization.

R. Garner, F.L.S.—On an Albino variety of Crab, with some observations on Crustaceans, and on the effect of Light.

Professor W. Köhne—On the Termination of Motor Nerves, and their connexion with Muscular Contractions.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

Sir Rutherford Alcock, K.C.B.—On the Civilization of Japan.

William Mathews, M.A.—On serious Inaccuracies in the Great Survey of the Alps, south of Mont Blanc, as issued by the Government of Sardinia.

Lieutenant-Colonel Sarel—On the Yang-tze-Kiang River, Canton.

Alfred R. Wallace—On the Eastern Archipelago and New Guinea.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

Frederick Purdy—On the Pauperism and Mortality of Lancashire, &c.

J. C. Buckmaster—On the Progress of Instruction in Elementary Science among the Industrial Classes under the Science Minutes of the Department of Science and Art.

James Heywood, F.R.S.—On Endowed Education and Oxford and Cambridge Fellowships.

SECTION G.—MECHANICAL SCIENCE.

Section G did not meet on Saturday, in order to enable the members attending this Section to visit the Middle Leval Dam and Siphons at Watlington.

MONDAY, OCTOBER 6, 1862.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

J. Glaisher—Report on Luminous Meteors.

J. Glaisher—On a new Barometer used in the last Balloon Ascent.

Prof. Hennessy—Report on Vertical Movement of the Atmosphere.

Prof. Sylvester—On the general Solution of the Linear Equation in Finite Differences.

Prof. G. Boole—On the Differential Equations of Dynamics.

R. Mallet—On the Measurement of Temperature of Active Volcanic Foci to considerable Depths, and of the Temperature and issuing Velocity of the Steam and Vapour evolved.

Prof. Hennessy—On the Relative Amount of Sunshine falling on the Torrid Zone of the Earth.

Prof. W. J. M. Rankine—On the Form and Motion of Waves at and near the Surface of Deep Water.

J. Park Harrison—On the additional Evidence of the Indirect Influence of the Moon over the Temperature of the Air, resulting from the Tabulation of Observations taken at Greenwich in 1861-2.

Dr. Gladstone—On the Distribution of Fog round the Coasts of the British Isles.

E. J. Lowe—On the Hurricane, near Newark, of May 7, 1862, showing the Force of the Hailstones and the Violence of the Gale.

F. Galton—European Weather Charts for Dec., 1862.

F. Galton—The "Boussole Burnier." A new French pocket instrument for measuring vertical and horizontal angles.

S. A. Rowell—On Objections to the Cyclone Theory of Storms.

Rev. Thos. Rankine—Meteorological Observations.

A. Claudet—On the Means of following the small Divisions of the Scale regulating the Distances and Enlargement of the Solar Camera.

SECTION B.—CHEMICAL SCIENCE.

Dr. B. H. Paul—On the Manufacture of Hydro-carbon Oils, Paraffin, &c., for Peat.

A. Vernon Harcourt, M.A., F.C.S.—On a Particular Case of induced Chemical Action.

T. Sterry Hunt, M.A., F.R.S.—On some Principles to be considered in Mineralogical Classification.

Prof. H. E. Roscoe—On Hypobromous Acid.

J. W. Osborne, Esq.—On the Essential Oils and Resins from the indigenous Vegetation of Victoria.

SECTION C.—GEOLOGY.

Prof. Phillips, F.R.S.—Supplementary Report on Slaty Cleavage: Theoretical Considerations.

Dr. T. Sterry Hunt, F.R.S.—Preliminary Report of the Committee for Investigating the Chemical and Mineralogical Composition of the Granite of Donegal, and the Associated Rocks.

Dr. Falconer, F.R.S.—On Ossiferous Caves in Malta, explored by Captain Spratt, R.N., C.B., with an Account of *Elephas Melitensis*, a pigmy Species of Fossil Elephant, and other remains found in them.

Captain Godwin-Austen, H.M. 24th Regt.—On the Glacier-Phenomena of the Valley of the Upper Indus.

Dr. K. von Seebach—On the Diluvial and Alluvial Deposits of Central Germany, and on the Climate of the Period.

C. W. Peach—On the Fossils of the Boulder-clay in Caithness.

C. B. Rose, F.G.S.—Noticed some Mammalian Remains from the Bed of the German Ocean.

Rev. J. Dingle—On Specimens of Flint Implements from North Devon.

Dr. Daubeny, F.R.S.—Exhibited Flint Implements from Abbeville and Amiens.

The Rev. T. G. Bonney, M.A.—Exhibited some Flint Implements from Amiens.

— Doughty—Exhibited Flint Implements from Hoxne.

Dr. Fritsch—Exhibited some Models of Foraminifera.

SECTION D.—ZOOLOGY AND BOTANY, INCLUDING PHYSIOLOGY.

Dr. Gray—On the Crocodiles of India and Africa, and on the change of form of the Head of Crocodiles.

Dr. Collingwood, F.L.S.—Report on the Mercantile Marine.

Dr. Collingwood, F.L.S.—On Geoffroy St. Hilaire's distinction between Catarrhine and Platyrrhine Quadrumana.

James Hinton—A Suggestion for the Physiological Classification of Animals.

Prof. Allman—On a new Form of Echinodermata.

Sir John Richardson—On Zoological Provinces.

Gilbert Child, M.D.—On Marriages of Consanguinity.

Rev. Thomas Hincks—On the Production of similar Medusoids by certain Hydroid Polypes belonging to different Genera.

Prof. Allman—On the generative Zooid of Clavatella.

Prof. Allman—On some new British Tubulariæ.

Prof. Allman—Report on the Reproduction of the Hydroids.

SUB-SECTION D.¹—PHYSIOLOGY.

John Davey, M.D., F.R.S.—Some Observations on the Vitality of Fishes as tested by increase of Temperature.

John Davies, M.D., F.R.S.—Some Observations on the Coagulation of the blood in relation to its Cause.

R. Garner, F.L.S.—Pearls—their parasitic origin.

Thomas Reynolds—Tobacco, in relation to Physiology.

R. Garner, F.L.S.—The Skull Sutures, and their relation to the Brain.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

The Chevalier Ignazio Villa—Terrestrial Planispheres.

The Rev. Dr. Mill—Decipherment of the Phœnician Inscription on the Newton Stone, Aberdeenshire. Communicated by the Rev. G. Williams.

Dr. Livingstone—Recent Letter to Sir Roderick I. Murchison.

John Crawford—On Language as a Test of the Races of Man.

T. Wright—Report on the Human Remains found in the course of the Excavation at Wroxeter.

Michelsen—Geography of Bread Plants.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

Henry Dunning Macleod, B.A.—On the Definition and Nature of the Science of Political Economy.

Herman Merivale—On the Utility of Colonisation.

Dr. Smith—A Statistical Inquiry into the Prevalence of numerous Conditions affecting the Constitution of 1,000 Consumptive Persons when in Health.

SECTION G.—MECHANICAL SCIENCE.

Wm. Smith, C.E.—Report of Steam-ship Committee.

Charles Atherton—On Unsinkable Ships.

W. Fairbairn, F.R.S., President of the Section—On the Results of some Experiments on the Mechanical Properties of Projectiles.

Theo. Aston—on Projectiles, with regard to their Power of Penetration.

R. W. Woolcombe—On Excentric Projectiles.

W. Thorold—continuation of his paper—On the Failure of the Sluice in the Fens, and on the Means of securing such Sluices against a similar contingency.

Dr. Odling delivered a discourse in the Guildhall, "On Organic Chemistry."

TUESDAY, OCTOBER 7, 1862.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

Col. Sykes.—Report of the proceedings of the Balloon Committee.

J. Glaisher.—Results and discussions of the Observations made in eight Balloon Ascents.

Dr. E. Esselbach.—On the duration of Fluorescence.

Dr. E. Esselbach.—On Electric Cables, with reference to Observations on the Malta-Alexandria Telegraph.

W. Esson.—On the Curvature of the Margins of Leaves, with reference to their growth.

Prof. J. Thomson.—On Disintegration of Stones exposed in buildings, and otherwise, to Atmospheric influences.

J. Ball.—Report on Thermometric Observations in the Alps.

Dr. Lee.—On a brilliant Elliptic Ring in the planetary nebulae R.A. 20h. 56m., N.P.D. 101°. 56', communicated by Mr. Lassell.

Isaac Ashe, A.B., M.B. T.C.D.—Some Cosmogonical speculations.

G. Miller Guy.—Account of an Electro-motive Engine

Rev. J. B. Reade.—Experiments on Photography with Colour.

Chev. Ignazio Villa.—On some improved celestial Planispheres.

C. M. Willich.—On some models of sections of the Cube.

SECTION B.—CHEMICAL SCIENCE.

J. B. Laws, F.R.S., F.C.S., and J. H. Gilbert, F.R.S., F.C.S.—On the Effects of different Manures on the mixed Herbage of Grass Land.

I. Maxwell Lyte, M.A., F.C.S.—On some of the Difficulties arising in the Practice of Photography, and the Means of removing them.

Charles Heisch, F.C.S.—On a simple Method of taking Stereomicrophotographs

William Odling, M.B., F.R.S.—On Ferrous Acid.

J. H. Gladstone, Ph.D., F.R.S.—On the means of observing the Lines of the Solar Spectrum due to the terrestrial atmosphere.

Dr. B. H. Paul.—On the Decay and Fermentation of Stone employed in building.

Prof. N. S. Maskelyne—On Aerolites from India.

Prof. N. S. Maskelyne—On Columbite from Monte Video.

SECTION C.—GEOLOGY.

Professor Ansted, F.R.S.—On Bituminous Schists and their relation to Coal.

Chas. Moore, F.G.S.—On the Palæontology of Mineral Veins, and the Oolitic age of some of the Mineral Veins in the Carboniferous Limestone.

Professor Owen, F.R.S.—On the Fossil-Feathered Animal (*Griphosaurus* of Wagner, *Palæopteryx* of Von Meyer) found in the lithographic slate of Pappenheim.

Dr. Allman, F.R.S.—On a new form of Recent Echinoderm, and its probable paleontological affinities.

Dr. T. Sterry Hunt, F.R.S.—On the Origin and Mode of Occurrence of the Petroleum of North America.

Dr. T. Sterry Hunt.—On the Structure and Origin of certain Limestones and Dolomites.

T. A. Readwin, F.G.S.—On the Gold-bearing strata of Merionethshire.

A. B. Wynne, F.G.S.—On the Geology of a part of Sligo.

F. J. Foot, M.A.—To exhibit and describe some of the six-inch Geological Maps of the Burren district, county Clare, Ireland.

Dr. Alexander Carte and W. N. Baily, F.G.S.—On a *Plesiosaurus* from the Lias of Whitby.

Gilbert N. Smith.—Report of a successful search for Flint Implements in a cave called "the Oyle," near Tenby, South Wales.

Rev. W. S. Symonds, F.G.S.—To exhibit some Scutes of the *Labyrinthodon* from the Keuper bone-breccia of Pendock, Worcestershire.

C. W. Peach—On New Fossil Fishes from the Old Red Sandstone of Caithness.

SECTION D.—ZOOLOGY AND BOTANY, INCLUDING PHYSIOLOGY.

No meeting.

SUB-SECTION D¹.—PHYSIOLOGY.

No meeting.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

Pierotti—Recent notices of the Rechabites. Communicated by the Rev. G. Williams.

Sir Charles Nicholson—Late Explorations in Australia, by Burke and Wills, Gregory, &c.

Robt. Dunn—Some Observations on the Psychological Differences that exist among the Typical Races of Man.

Jules Gérard—Exploration dans l'Afrique centrale, de Sierra Leone, à Alger, par Timbuctu.

Henri Mouhot—Cambodia and the Laos States.

R. S. Poule—On the Ethnology of Egypt.

Rev. T. G. Bonney—Geography of Mont Pelvoux, in Dauphiné.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

The President.—On the Subject matter and Methods of Competitive Examinations for the Public Service.

Rev. Wm. Emery, B.D.—On the Expenses and Social Condition of University Education.

Henry Roberts, F.S.A.—Statistics which shew the increasing circulation of a Pure and Instructive Literature, adapted to the Capacities and the Means of the Labouring Population.

Rev. W. N. Molesworth, M.A.—On the Instruction and Training of the unemployed in the Manufacturing Districts during the present Crisis.

W. Stanley Jevons, M.A.—Notice of a General Mathematical Theory of Political Economy.

W. Stanley Jevons, M.A.—On the Study of Periodic Commercial Fluctuations.

Edwin Hill.—On the Prevention of Crime.

SECTION G.—MECHANICAL SCIENCE.

Wm. Smith, C. E.—Report of the Committee on Railway Accidents.

L. Williamson.—The relative merits of Iron as compared with Wooden Ships, as regards Repair and Security of Life.

Professor J. M. Rankine—On the Form and Motion of Waves at and near the Surface of Deep Waters.

C. Vignoles—On the Practice and Principles of Diverting Rivers and Stoppage of the Breaches in Embankments.

J. Sewell, Assoc. I.C.E.—On the Prevention of Railway Accidents.

T. Sortais—On an Improved Printing Telegraph Apparatus.

J. W. Osborne—Instruments for Observing the Motion of Vessels at Sea with reference to Sea sickness.

A. C. Tylor—On the Manufacture of Armour Plates.

A *converzazione* took place in the Guildhall, at which M. Claudet exhibited, by the solar microscope, illuminated by means of the oxyhydrogen lime light, enlarged pictures of small photographs.

WEDNESDAY, OCTOBER 8, 1862.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

Latimer Clark.—On Electrical Tensions.

J. Croll.—On the Cohesion of Gases, and its relations to Carnot's function, and to recent experiments on the Thermal effects of Elastic Fluids in motion.

E. Vivian.—On the Trajectory Target for Long-range Rifle practice.

E. Vivian.—On the Results from Self-registering Hygrometers.

Rev. F. Bashforth.—On Capillary attraction—comparison of Theory and Experiment.

Sir W. R. Hamilton.—Quaternions proof of a Theorem of Reciprocity of Curves in Space.

Dr. Hurlburt.—On the Storms of the St. Lawrence and Great Lakes of Canada.

Dr. Hurlburt.—Some Facts relating to two brilliant Auroras in Canada.

J. Schwarcz.—On the probable Origin of the Heliocentric Theory.

J. Smith.—Remarks on the Complementary Spectrum.

J. Dingle.—On the Supernumerary Bows in the Rainbow.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

David Chadwick.—The Cotton Famine and Substitutes for Cotton.

Henry Harben.—Some Statistics of *Zostera Marina* as a Substitute for Cotton.

Proceedings of Institutions.

BIRMINGHAM AND MIDLAND INSTITUTE.—On Wednesday evening, the 29th of September, the academical session of this Institute was inaugurated by an address from the Right Hon. Sir John Pakington, Bart., the President. The address was delivered in the theatre of the Institute, which was well filled. He observed that there had been only one previous occasion on which he had attended a public meeting in connection with this Institute, and that was in 1855, when the late Prince Consort came to lay the foundation stone of the building, and when, in the course of a wide and admirable address, he laid down the principle of "the introduction of science and art as the unconscious regulators of productive industry." A year has not yet elapsed since every British home was involved in sadness and gloom by the sudden tidings that, in the prime of his days, in the vigour of his great intellect, in the midst of his useful career, the Prince was dead, and it was impossible for us not to feel that we have lost the wise and thoughtful adviser of our beloved Sovereign—the patron of art, the friend of education, and the promoter of every social improvement which could increase the comfort or elevate the character of the people. Seven years had passed away since that auspicious inauguration, and perhaps it might be well to inquire what had been done by this Institution during those seven years. On the occasion to which he (Sir J. Pakington) referred, the Prince in his address had alluded to those branches of knowledge which had long been selected as the essential elements in the teaching of our great academies and seats of instruction. He referred to those sciences, such as politics, jurisprudence, political economy, and others, and, finally, he gave emphatic advice as to the line of study which he would recommend them to pursue, as relating most closely to the special objects of this Institution, viz., the sciences of mechanics, physics, and chemistry, and the fine arts in painting, sculpture, and architecture. It was

clear from these annual reports that this advice had not been neglected. It was impossible to consider without deep interest the range of study which had been established and carefully carried out from the commencement of this institution—a range of study by which the middle classes and skilled artisans of this great city had the means of moral and intellectual improvement placed within their reach. When he saw that certificates had been granted to very many candidates for competent knowledge of one or more of the sciences, for English history and literature, the French and German languages, English grammar and composition, and mathematics, he could not refrain from comparing such a course of study with the teaching given by our great public schools to the sons of the highest and wealthiest citizens of the State. He was not disposed to question the advantages of classical acquirements, but he must, at the same time, confess that the almost exclusive teaching of the dead languages which had long been the system of our Universities and great public schools, appeared to him to be a serious error. It was, doubtless, true that school teaching might be regarded as only laying the foundation for subsequent self-culture. But this foundation should, in his opinion, be as broad as possible? No study in after life could compensate for neglect in youth, and it was a grievous waste of those precious years when learning is the first business of life, and when there is in the human mind a power of acquiring and retaining knowledge which never recurs, that a large portion of the youth of England should be taught, between the ages of seven and twenty-one, little besides Greek and Latin. The teaching of all classes should be adapted to the circumstances of the age. None can afford to disregard the rapid progress which is the characteristic of the present century. After enlarging upon this subject at some length, the President said he understood that an application had been made to the Council to include Latin amongst those taught in the Institute, and he hoped this would be favourably received. He then alluded to some other subjects, the omission of which he regretted. Amongst them was physiology. Year after year the reports of this Commission repeated that their sanitary efforts were obstructed and often rendered nugatory, by the prevalent ignorance among all classes of the natural conditions of health—an ignorance which prevented the advantages of sanitary measures from being either understood or appreciated. The Government was, therefore, advised to introduce physiology into the common schools of the country, and he thought the importance of the subject in relation to health could hardly be overrated. Another subject which he would urge them to include in their course of instruction was geology, the bearing of which upon many of their manufactures was evident. The trade of Birmingham consisted mainly of the manufacture of brass, electroplate, guns and gun barrels, metal pens, jewellery, and glass. Were not the materials which are required for each and all of these manufactories exactly those with which the study of geology would tend to make them better acquainted? Even glass was no exception. The sands, the alkaline salt, lead, and other materials which enter into the composition of glass were all within the scope of geology, as were the various mineral substances required for the other trades he had mentioned. Another omission of the programme was the absence of any class for drawing. He had been informed that the absence of any drawing class was caused by the fact that the Birmingham School of Design is accommodated within their building. This was certainly an explanation; but still, as theirs was an admirable, a model institution, and the study of drawing was undoubtedly one which ought to occupy a foremost place, he would rather see it included in the duties of their own teachers than left to the care of another body with which they had no real connexion, and over which they had no control. Artistic skill in drawing, and taste and fertility of design, were quite essential to most of their manufactures. Practical mechanics was another subject which might, he ventured to

think, be advantageously inserted in their list of classes, as bearing directly upon some of those occupations to which the lives of some of their students must be devoted. But he would no longer dwell upon these supposed defects, but would turn with far greater pleasure to the remarks which he wished to make upon their system of study, and upon the degree of success which had attended it. That success had been such that the language of truth must be language of congratulation. Their teaching power was evidently, at present, adequate and good. And it was likely to remain so, owing in a great degree to the wise decision at which they arrived two years ago, not to accept gratuitous teaching, however competent the teacher, or however generous his intentions, but to pay for such services in every case. Not only had the number of certificates granted by the Council of the Institute increased very considerably from year to year, but the candidates had been tried by other severe tests. A most valuable stimulus had of late been given to secondary education, and a most useful encouragement to competent teaching by the establishment of the examinations by the Society of Arts, and the Science and Art Department of the Government in different parts of the country. They had had for three years the benefit of the former, but to the latter they last year submitted for the first time. The result had been most creditable. In the first year of the Society of Arts' Examination 13 candidates—examined in either chemistry, algebra, French, English history, or geometry—obtained two first-class certificates, and 11 others. In the second year, 17 candidates obtained five first-class and 12 others. Last year the competition was divided between the Society of Arts and the Science and Art Department, and of 19 candidates examined by the latter in chemistry, or experimental physics, two obtained a first-class Queen's prize and medal; three, second-class Queen's prize; five, third-class Queen's prize, and the rest "passed." That every one of the candidates who submitted, on this first occasion, the examination by the Science and Art department should have been able to pass, was a most gratifying fact; but other proofs were not wanting, both of the successful teaching they had given and of the good effects which, in various ways, result from the existence of such an institution. He had seen a list of not a few names of young men who received their scientific training in that institute, and who were now filling with honour to themselves situations in which scientific knowledge is required. The President strongly urged upon all classes to avail themselves of the advantages of this Institution. It welcomed and taught the artisan, but it aimed at higher educational purposes, and it offered education such as, in his opinion, the middle, and, indeed, the upper classes of that great city, might with advantage to themselves accept. He hoped the day was not distant when they might see different classes mingling to a considerable extent, not only in the primary school, but in the secondary college, and this admirable institute seemed to invite the introduction of such a system. He made some reference to the advantages offered by the Free Library which was located near the Institute to which it would be a valuable adjunct. Sir John Pakington concluded as follows:—"A few years ago the skilled artisan was a man who, by personal aptitude, had attained a certain degree of manual dexterity or inventive power; now the skilled artisan is a man of scientific education and cultivated intellect, fitted to take his place among the most intelligent of his fellow-citizens, and to rise, according to the measure of his capacity, to honours of the State. It is impossible not to feel that such changes have great political importance. The system of government under which we live involves us all in serious responsibilities, and the more enlightened are the people the greater is our security for those responsibilities being faithfully fulfilled. The man who has studied the history of this country is the least likely to undervalue our institutions. This is not the moment for me to dwell upon the warning which we may derive from the events which

are now passing in America; but I may, in perfect consistency with my present duty, express my belief that our suffering countrymen in Lancashire would not have borne their sad privations with the fortitude which has done them so much honour, had it not been for the effect which the increase of education and refinement had produced upon the habits and feelings of the people. I may also congratulate you who are engaged in the trade of Birmingham that you have found in the extension of your commerce with France some compensation for the decrease of your American trade, and I trust you may never be exposed to any trial so painful and severe as that which has now fallen—but God grant it may be only for a brief period!—upon the operatives of Lancashire. There is only one topic more on which I am desirous to touch. When your late respected president (Mr. Ryland) did me the honour last winter of inviting me to become his successor, I wrote to him for information upon certain points connected with the Institute, and his answer concluded with the following words:—"It is a great success, and in working to bring about that success all parties in politics and religion have heartily co-operated." This fact is honourable to your citizens. Under the English system of government party action is a necessity, and men are prone to be wain in support of that which they sincerely believe to be right and essential to the welfare of their country; but party has no business here. Here men of all parties may meet on common ground, and, working together for an object of common interest, may learn to respect each other's motives, and to believe in the honesty and sincerity of each other's intentions. I trust you will long continue to act in this spirit. You have founded a noble institution. You have, as the Prince Consort predicted, "Conferred an inestimable boon upon your country;" and I trust you may receive your best reward in seeing its continued prosperity and its increasing good effect upon the knowledge, the intelligence, and the character of your fellow-citizens." At the conclusion of his address a vote of thanks to Sir J. Pakington was moved by the Mayor, and carried by acclamation.

POLYTECHNIC INSTITUTE, LONDON.—The distribution of certificates took place on Monday evening, the 6th inst., in the presence of about 700 persons, assembled to witness the entertainments of the Polytechnic Institution. The Rev. Charles Mackenzie (Hon. Director of the Educational Department) distributed to the successful students the certificates which they had obtained at the late Examinations conducted by the Society of Arts. The chairman explained the distinction between the Educational and other portions of the Polytechnic Institution, &c., and the particular operations of the Examination from which those certificates were obtained. He also showed that these classes differed from those which he had established in the City of London in two important particulars—they were for ladies as well as for gentlemen, and were open in the morning as well as the evening. After paying a tribute to the masters, and congratulating the students upon their success, he asked the company assembled for their sympathy in a cause which was calculated to meet the wants of the day, and to improve the social and moral conditions of the growth of the nation.

MEETING FOR THE ENSUING WEEK.

MONDAY.—Medical Society, 8½. Dr. J. Cockle, "On Aneurismal Tumours, involving the Neck."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, September 26th, 1862.]

Dated 16th September, 1862.

2538. B. F. Weatherdon, Kingston-upon-Thames, and E. H. C. Monckton, Fineshade Abbey, Northamptonshire—A new or improved engine for obtaining and applying motive power.

2544. R. Lakin, Ardwick, Lancashire—Imp. in the mode of plating or shielding ships of war.
 2546. C. E. Guye, Fleurin, Switzerland—Imp. in apparatus for cutting and finishing the teeth of wheels. (A com.)

[From Gazette, October 3rd, 1862.]

- Dated 22nd May, 1862.
 1548. P. R. Hodge, Tokenhouse-yard—An improved dinner, supper, breakfast, or dessert plate.
 Dated 31st May, 1862.
 1648. T. T. Lawden, Birmingham—Imp. in certain descriptions of single and double barrelled guns.

- Dated 19th June, 1862.
 1806. H. Rushton, 48a, Northampton-road, Clerkenwell—Imp. in plating machines to plait cotton yarns, silk, or like fibrous materials.

- Dated 28th July, 1862.
 2133. T. A. Favrichon, St. Symphorien de Lay, France—An apparatus for the speedy and economical heating of baking ovens, and also for using their excess of heat.

- Dated 15th August, 1862.
 2299. J. Barclay, Gravel-lane, Southwark—Improved machinery for the manufacture of nails.

- Dated 21st August, 1862.
 2336. M. Wilkinson, Blackburn—Imp. in carding engines, parts of which imps. are applicable to drawing and such like frames.

- Dated 26th August, 1862.
 2365. G. Davies, 1, Serle-street, Lincoln's-inn—Improved machines for washing skeins of cotton, linen, wool, or silk. (A com.)

- Dated 1st September, 1862.
 2420. W. C. Edge, Clerkenwell—Imp. in the manufacture of Albert chains, and in the mode of securing the same to the vest of wearer.

- Dated 4th September, 1862.
 2446. W. Clark, 53, Chancery-lane—Imp. in the manufacture of a blue colouring matter. (A com.)

- Dated 11th September, 1862.
 2495. W. A. Munn, Throwley-house, Faversham—An improved apparatus for capping, loading, and closing cartridges for breech-loading fire-arms.

2497. G. Weeks, Bromley, Kent—Imp. in constructing frames, trays, pots or holders for flowers, plants, or shrubs, growing or otherwise, with arrangements for their display, and also for drainage.

2499. F. Datchy, Mortimer-street, Middlesex—Imp. in steam engines.

2501. R. A. Brooman, 166, Fleet-street—Imp. in implements for cultivating the soil. (A com.)

2505. A. Barclay, Kilmarnock, Ayr, N.B.—Imp. in locomotive boring and winding engines.

2507. J. Walker and F. Walker, Leeds—Imp. in machinery for combing and carding or hackling flax, silk, wool, and other fibrous substances.

2509. T. Molineux, 37, John Dalton-street, Manchester—Imp. in pianoforte actions.

- Dated 12th September, 1862.
 2511. A. E. H. B. Butler, Kirkstall Forge Company, Leeds—Imp. in machinery for straightening and polishing cylindrical bars of iron and other metals.

2512. J. B. Smith, Bury—Certain imp. in washing and mangling machines, applicable in part to steam dyeing and to bleaching.

2513. J. Thom, Canterbury-place, Lambeth, Surrey—Imp. in mounting or fitting artificial teeth.

2514. J. R. Johnson, Stanbrook-cottage, Hammersmith, and J. S. Atkinson, 31, Red Lion-square—Imp. in machinery for manufacturing printing types.

2515. J. Bower, Carlou—Imp. in railway sleepers.

2517. J. Howie, Hurlford, Ayr, N.B.—Imp. in the construction of crossings and switches of railways.

2519. H. Higgins, Salford—Imp. in machinery or apparatus for opening, cleansing, or carding cotton and other fibrous materials.

- Dated 13th September, 1862.
 2521. W. Harkes, Lostock Gralam, Chester—Imp. in machinery for mowing and reaping.

2523. M. Chadwick, Chapel Field, near Manchester—Imp. in machinery for doubling, folding, or plaiting cloth or other woven fabrics.

2525. T. W. Cowan, Greenwich—Imp. in the construction of portable or fixed pumps.

2527. H. Bennett, Wombridge Iron Works, Shropshire—Imp. in machinery or apparatus for the rolling of wire rods.

- Dated 15th September, 1862.
 2529. E. G. Chant, London—Imp. in self-binding portfolios or holders for newspapers, music, documents, letters, and other papers, or for woven and other fabrics which it may be desired to bind or hold together.

2533. W. L. Tizard, Mark-lane—Imp. in the construction of ships, vessels, cupolas, and forts, and in apparatus employed therein.

2535. J. Webster, Birmingham—Imp. in the manufacture of nitric and nitrous acids, and other nitrogenous compounds.

- Dated 16th September, 1862.
 2537. J. Whines, Pimlico—Improved machinery for filling dipping clamps with tapers and match splints.

2539. J. G. Bunting, 4, Trafalgar-square, Charing-cross—A mechanical horse break.

2541. S. Flexen, Braziers'-buildings, Farringdon-street—Imp. in apparatus for ventilating railway and other carriages.

2543. R. Moreland, jun., 5, Old-street, St. Lukes—Imp. in machinery for preparing and cutting hops.

2545. H. Jordan, Southampton—Imp. in rotatory engines.

- Dated 17th September, 1862.
 2547. L. Leigh, Manchester—Imp. in certain machinery for stretching and glossing silk, wool, and other fibrous materials.

2549. R. Cranston, London, Edinburgh, and Glasgow—An improved washing machine.

2550. J. Simpson, Hulme, Lancashire—An improved composition for coating or covering moulded or other surfaces, and in apparatus for applying the same thereto.

2551. W. E. Newton, 66, Chancery-lane—Imp. in watches or time-keepers. (A com.)

2553. J. Douglas, Blackfriars-road—Imp. in apparatus applicable to close fire ranges usually termed kitcheners, for the purposes of ventilation.

2555. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in gas burners. (A com.)

- Dated 18th September, 1862.
 2558. R. Kay, Castleton Print Works, Blue Pits, Lancashire—Certain imp. in printing calico and other surfaces, and in apparatus connected therewith.

2560. W. H. Browne, Theobalds road, and H. Armstrong, Manchester-street—Imp. in dry and wet gas meters.

2562. J. W. Woodford, 12, Sutherland-street, Walworth—Imp. in machinery and apparatus used for driving and drawing piles, also for raising soil, and also in shoes and hoops for piles.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

2602. W. Clark, 53, Chancery-lane—Imp. in signalling. (A com.)—24th September, 1862.

2612. M. A. F. Mennons, 24, Rue du Mont Thabor, Paris—Imp. in the construction of chair settees. (A com.)—25th September, 1862.

PATENTS SEALED.

[From Gazette, October 3rd, 1862.]

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| October 3rd. | 1023. W. Nunn. |
| 956. T. Silver. | 1024. J. Houghton. |
| 959. G. Moulton. | 1027. C. P. Coles. |
| 963. S. Fielding, S. Fielding, jun., R. Fielding, and T. Fielding. | 1030. H. Deacon. |
| 964. R. A. Brooman. | 1033. G. Burge. |
| 972. W. Begg. | 1034. C. Bartholomew and J. Heptinstall. |
| 974. J. Colling. | 1037. W. Fox. |
| 975. A. Clark. | 1043. W. E. Gedge. |
| 976. L. Faconnet. | 1045. F. Rigollot. |
| 977. R. A. Zobitzsch. | 1049. W. Clark. |
| 980. C. S. Duncan. | 1054. J. Bunnett. |
| 982. W. Simons. | 1065. F. Tolhausen. |
| 985. G. Haseltine. | 1069. J. K. Hampshire. |
| 987. T. Jackson. | 1071. C. Harratt. |
| 991. J. Brown. | 1085. G. Bedson. |
| 997. F. W. Brearey. | 1088. R. A. Peacock. |
| 998. E. H. C. Monckton. | 1188. W. E. Newton. |
| 999. J. Jaques, jun. | 1202. R. Mushet. |
| 1000. B. Sharpe. | 1224. W. E. Newton. |
| 1004. J. Wright. | 1262. W. E. Newton. |
| 1005. T. Cobley and J. Wright. | 1285. W. E. Newton. |
| 1007. J. E. H. Andrew. | 1319. S. Merolla. |
| 1009. G. Hollinshead. | 1320. W. E. Newton. |
| 1010. J. Bullogh and J. Bullogh. | 1646. J. Betteley. |
| 1011. W. Taylor. | 1731. J. Alison. |
| 1013. J. Jones. | 1857. E. C. Nicholson. |
| 1014. J. Langston. | 1877. J. B. Coquatrix. |
| 1016. J. Knowelden. | 2162. W. Wanklyn. |
| | 2189. J. Briggs. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, October 7th, 1862.]

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| September 29th. | 3rd October. |
| 2218. W. H. Buckland. | 2267. J. Macintosh. |
| 30th September. | 2269. J. Macintosh. |
| 2228. A. S. Stocker. | 2274. E. O'Connell. |
| 2286. W. Brookes. | 2313. A. Whytock. |
| 2nd October. | 4th October. |
| 2262. W. E. Newton. | 2277. W. Macfarlane. |
| 2263. W. E. Newton. | 2283. W. E. Newton. |
| | 2306. C. F. Beyer. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, October 7th, 1862.]

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| 29th September. | 2267. J. Thornton, A. Thornton, W. Thornton, and H. Thornton. |
| 2191. J. R. Musgrave, R. Musgrave, and J. Musgrave. | 3rd October. |
| 30th September. | 2230. T. Dickens. |
| 2184. W. Kempe. | 2232. F. C. Lepage. |

Journal of the Society of Arts.

FRIDAY, OCTOBER 17, 1862.

INTERNATIONAL EXHIBITION OF 1862.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Re-

ports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s. ; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

It was the intention of the Council to issue the volume complete in the early part of September, but as several of the Reports have not yet been received by Her Majesty's Commissioners, the completion of the entire work has been unexpectedly delayed; the Council, however, unwilling to defer the publication of the Reports already completed, have issued to the subscribers those that have been received up to the present time. When all the Reports are delivered, the parts now issued to subscribers will be exchanged, if uninjured, for the perfect volume, bound or unbound, as desired. Individual reports are sold separately; for prices see advertisement.

INTERNATIONAL EXHIBITION OF 1862.—VISITS OF SCHOOLS.

The following is a continuation of the Schools reported to Her Majesty's Commissioners as having entered the Building from the 6th to the 9th of October :—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Oct. 6	Canterbury	Cathedral Choristers.. ..	The Dean	23	163
" "	Oxford.. ..	Blue Coat... ..	Subscription	63	
" "	City of Oxford	Nixon's	Subscription	77	
" 7	Islington	Holy Trinity	Subscription	35	237
" "	Chislehurst	National	Rev. F. Murray	26	
" "	Paddington	St. John's (Servants)	Subscription	21	
" "	Paddington	St. Stephen's	Rev. W. A. Newton.. ..	7	
" "	London	St. Dunstan's-in-the-West	H. Southgate	50	
" "	Foot's Cray, Kent	National	Subscription	40	
" "	Manchester	Trafford Mount.. ..	Dr. J. W. Hudson, F.S.A.	14	
" "	Harrow Weald... ..	Parochial	Subscription	44	
" 8	Brighton	All Souls'	Subscription	15	215
" "	Godstone	Sunday and National	Subscription	71	
" "	Peckham	Collegiate... ..	Rev. Thos. Ray	21	
" "	Brook-street	Refuge	Committee.. ..	18	
" "	Brixton-hill	British	Committee.. ..	26	
" "	Carshalton, Surrey	British	S. Gurney, Esq.. ..	64	
" 9	Southwark	King Edward's	The Governors... ..	25	
" "	Southwark	St. Saviour's	Subscription	126	
" "	South Mimms	National	W. Ramsden Price, Esq.	26	
" "	Lymington & Baldre	National and Sunday	{ Lord G. Lennox and Mr. Mackinnon .. }	313	
" "	Upper Norwood	National	Anonymous	180	
" "	Clapton	St. James's College... ..	The Warden	13	
" "	Stepney	Trinity Church Choir	Rev. F. S. Lea	16	
" "	St. Marylebone.. ..	Trinity Choir	J. Alexander, Esq.	12	
" "	{ St. Martin's, West- minster }	Sunday	Friends	37	
" "	{ Harp-alley, Far- ringdon-street.. }	British	Subscription	12	
" "	Streatham	Christ Church	Rev. W. Raven	30	
" "	Upper Tooting... ..	Holy Trinity	Rev. F. Borradale	20	
" "	Hastings	St. Mary's, Sunday	Miss Mirlees	138	
" "	Hillingdon	National	Rev. Richard Croft	90	
" "	Wells-street	St. Andrew's Choristers	Lord Dillon	15	1,053

VISITS OF WORKMEN.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building from the 6th to the 11th of October :—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
Oct. 6	Tailors	17, Old Bond-street	Messrs. Doudney and Sons ...	45
" "	Men of the 91st Regiment	Chatham	{ Colonel Patterson, Capt. } { D'Eye, & Lieut. Armstrong }	45
" "	Agricultural Labourers	Milton, near Canterbury	R. Lake, Esq.	55
" "	Agricultural Labourers	{ Stanton Wyvell, Leices- } { tershire }	Rev. T. Burnaby	15
" "	Mechanics	Millwall	Burney and Bellamy	61
" "	Printers	Cursitor-st., Chancery-lane	Mr. Trounce	17
" "	Men of the 83rd Regiment	Dover	The Officers	152
" 7	Maltsters	Aylesworth	Mr. Burleigh	20
" "	Agricultural Labourers	Searls Fletching, Sussex	Sir Thos. Wilson, Bart.	37
" "	Labourers	Southam, Warwickshire	Subscription	65
" "	Agricultural Labourers	Banbury, Oxon	E. Wilson, Esq.	30
" "	Agricultural Labourers	Overstone	Mr. Owen Wallis	16
" 8	Seamen of H.M.S. <i>Cornwallis</i>	Hull	Capt. Grenfell	12
" "	Estate Labourers	Stratton-park, Hants.	Sir G. Baring.	36
" "	Mechanics and Labourers	Woolhampton, Berks	Jas. Blyth, Esq.	60
" 9	Boys of H.M.S. <i>Fisguard</i>	Woolwich	Commander Lysett	60
" 11	Builders' Workmen	Camden Town	Mr. Samuel Walton	40

PRODUCTS OF INDIA.

The following notes are extracted from the official Catalogue of the contributions from India to the International Exhibition of 1862.

STARCHES.

Arrowroot, both wild and cultivated, grows remarkably well in the district of Cuttack. It is not easy to decide whether the wild is identical with our garden arrowroot. A cup of arrowroot made of the one is not distinguishable from a cup made of the other, except, perhaps, by a slightly earthy taste and smell observable in the wild arrowroot, which is easily accounted for by its imperfect manufacture. The cultivation and more perfect manufacture of the garden arrowroot have been comparatively recently introduced into the province, so that it is neither generally grown nor its produce used by the natives. A specimen has been sent to the Exhibition, made from plant of his own growing, by a native Christian of "Klundittur," who sells his produce among the European residents of Cuttack, his price being a little under 6d. per English lb. This arrowroot is of excellent quality, and the process of manufacture as simple as may be. The tubers are taken up in the cold season, washed, put into a large wooden mortar, and mashed. The mash is then taken out, and well washed in cold water, the water drained off, and set to stand in large flat vessels, in which it deposits a large proportion of the arrowroot flower, which is re-washed in cold water, and set to dry in the sun. The wild arrowroot, known in the bazaar as "Palooa," is a plant growing abundantly in the jungles of the district. It is collected in the cold season by the Sahars, the tubers pounded and mashed, and the sediment dried in the sun. By these people it is eaten and sold for the manufacture of what is called "Abheer." In the Sumbulpore, and to a less degree, also in the Cuttack district, the wild arrowroot is made into cakes, or boiled with milk, and thus used as an article of food.

Starch made from the wild ginger grows everywhere in the Chittagong district; it is very difficult to eradicate it from land, as the smallest root or piece of a root has an eye, and will spring up again. The plant dies off in December. A rough experiment was made with this root by the Civil Assistant-Surgeon of that place, Dr. W. B. Beatson, and the yield was estimated at one ounce of

starch from one pound of the root. The experiment, however, was not precise enough to be satisfactory, and he is inclined to think that the yield would be much larger, as the microscope shows the root to be loaded with starch granules. The supply of the root being inexhaustible, any quantity of starch might be extracted from it yearly, and it might be found a valuable article of commerce; there would be no expense of cultivation, and allowing for the cost of digging the root, and manufacturing the starch by bruising and macerating the root in water and drying the deposit, the product would be cheaper than Arracan rice, which is believed to be largely exported to Europe to be used, not as food, but in manufacture for glazing linen, &c.

A substance called Behchandee, if pulverized, resembles arrowroot, and is made use of by natives on fast days, prepared in various ways. It is obtained from the glutinous matter which issues from the stems of a jungle plant, after being soaked in running water for some days. The Gonds prepare the Behchandee. It can be had in any quantity in the Jubbulpore bazaar, but most of it comes from Mundla and Seonee.

RESINS AND GUM RESINS.

"*Khair*" as locally called, the kut or cutch of commerce, catechu—exploded name Terr Japonica, is produced in Cuttack. This is the inspissated juice of the *Mimosa Catechu* (Linn.), known locally as the "*Khair*" tree. The tree is common throughout the jungle tracts of this division. The *modus operandi* of its extraction is as follows:—A tree, being felled, is barked and branched, and the sound wood cut into logs and split into pieces of the proper size. These are then placed in large earthen pots, filled with water, on the fire, and thoroughly boiled. The liquid thus impregnated with the resin or juice is then drained off into smaller pots, which are frequently replenished, and the process of boiling continued, till the water is evaporated, and the *residuum*, a thick cake of "*Kut*," is then removed, or the resin in a semi-liquid state is turned out into leaves pinned together in the shape of cups or moulds, and then left to drain and harden. A small portion only of this produce is locally consumed, the rest exported. Here it is principally used with "*pân*," in solution as a lotion for suppurating wounds, and by the dyer. The local retail price in the bazaar is 15s. for the maund of 100 lbs. English.

It is also obtained from the *Acacia Catechu*, of which tree there are vast numbers all over Pegu and Burmah. This is one of the staple exports of Pegu: the value of Cutch exported in the year 1860-61 being £72,000. Price—Rs. 20 for 365 lbs.

Sakhoo, *Shorea Robusta*, is produced in Lucknow. It grows spontaneously in the Taracee. It is a kind of resin which exudes from the above tree; natives boil it with linseed oil and use it instead of tar, called *Dhoona* or *ral*, and also for varnishing. $3\frac{1}{2}$ seers per Rupee.

Resin, locally called "*Jhoona*," "*Dhoona*," is found in Cuttack. This is apparently a resinous gum, which is obtained from the *Shorea Robusta*, one of the most abundant forest trees in the jungles. It is procured by making incisions in the stem of the tree, from which the resin exudes, and is collected. The local retail price is about 3 annas, that is $4\frac{1}{2}$ d. per seer of $2\frac{1}{2}$ pounds weight.

Ing Doay wood, resinous, is a hard substance used for caulking boats.

Sooparee or Goa, the Goobak of the Sungscree classics, is the nut of the *Areca catechu*. This graceful tree is cultivated to any extent only in the Pooree district. The nut is used in this province almost exclusively in conjunction with other ingredients, with the leaf of the "Piper Betel," forming together the well-known masticatory of the East "*Pan*." Locally at Cuttack the best nuts are retailed at about 2 annas per English lb. weight. The tree is grown in company with the cocoanut in plantations in moist situations, and, like the cocoanut, is productive and valuable. The cultivation of both trees, but more especially the cocoanut, was, up to a recent date, almost entirely in the hands of a class of Sasum Brahmins, who were enabled so long to maintain the monopoly by the aid of a superstitious belief that a fatality attached to the planting of these trees by any one not a Brahmin. An astringent extract is also obtained from old areca nuts, which is used in dyeing processes.

Naphtha, locally called Benanee, is produced in Ramree, Akyab, Leydounge Circle. It is used as varnish for oiling boats, posts, &c. There are two wells; they each produce about 14 maunds per annum. No great increase is expected. The naphtha is clear and bright, and none is exported. Price—from 6 to 7 Rupees per maund of 80 lbs.

Stick Lac is found in large quantities in the jungles of Chota Nagpore.

Thetsee Varnish, the celebrated Burmese black varnish, is obtained from *Melanorrhæa usitatissimum*. In varnishing an article the Burmese first give it a coat of an inferior quality; when this is dry, they lay a coat of a superior quality over it, and finish with a coat of the best over all. Price—Rs. 120 for 1st quality; Rs. 80 for 2nd, and Rs. 60 for 3rd quality, for 365 lbs.

Wood oil, called Kee eintsee, produced in Kaladyne, in Akyab district, is used for burning and varnishing; 100 maunds or more procurable. Not exported: used in the province. Price—from 5 to 7 Rupees per maund.

GUMS.

Babool is an inferior kind of Gum Arabic, which the natives called *Joud*; it exudes from the tree *Acacia Arabica*: 4 seers for the Rupee.

Gum Kino, the gum of either *Pterocarpus Indicus*, or *Pterocarpus Wallichii*, is found in the Rangoon. It is one of the most abundant of the forest trees. Any quantity of Gum Kino might be exported, but the demand is at present limited. Price—Rs. 5 per 365 lbs.

The bark of the buglar tree is used as glue for joining woods.

Caoutchouc is a new production, collected and prepared from the various plants of the district of Goruckpore.

TOBACCO.

Tobacco is cultivated in the province of Moultmein, and is much used by the natives, but not exported.

The tobacco grown in the province of Burmah is inferior, though the soil is well suited to the finer kinds; yet though seed has been largely distributed, and many

efforts made to improve the cultivation, the Burmese continue wedded to their old ways. Price 35 to 40 Rupees per 365 lbs.

The tobacco grown in the district of Cuttack it is feared has very much deteriorated through careless and negligent culture. The dry leaf is barely smokeable by any one not a native, almost on account of the imperfect manner in which it has been cured. Such as it is, it is grown for local consumption pretty generally on what is called "Pattoo" soil, a rich, black, clayish deposit found on the banks and in the beds of rivers. The Ooryahs are great smokers. The wholesale price of the first quality ranges from 6 Rupees or 12s. to 8 Rupees or 16s. the 100 couple.

Tobacco is much used for smoking in Kaladyne; 5,000 maunds produced, but might be increased, if required. Price—25 Rupees per maund.

20,000 maunds are procurable in the district of Sandoway. The country and soil will not admit of any material increase of cultivation. For some years Messrs. Mohr, Brothers, and Co. exported Sandoway tobacco to Europe, but for the last two years none has been exported thither. The bulk of the crop is consumed by the Mugs in this province, in the shape of cigars, in smoking, and some 2,000 maunds are taken to Calcutta and Chandernagore, and are there manufactured into cigars. Price—12 Rupees per maund.

WOOL.

The following woollen substances are used in the Punjab:—

(1). *Pashum*, or shawl wool, properly so called, being a downy substance, found next the skin and below the thick hair of the Thibetan goat. It is of three colours; white, drab, and dark lavender (*Tusha*).

The best kind is produced in the Semi-Chinese Provinces of Turfan Kichar, and exported *via* Yarkand to Kashmere. All the finest shawls are made of this wool, but as the Maharajah of Kashmere keeps a strict monopoly of the article, the Punjab shawl weavers cannot procure it, and have to be content with an inferior kind of Pashum produced at Châthân, and exported *via* Leth to Umritsur, Nürpur, Loodianah, Jelapûr, and other shawl-weaving towns of the Punjab. The price of white Pashum in Kashmere is, for uncleaned, 3 to 4s. per lb., ditto cleaned, 6 to 7s. per lb.. Of *Tusha* ditto, uncleaned, 2 to 3s. a lb.; cleaned, from 5 to 7s.

(2). *The fleece of the Dumba sheep of Kabul and Peshawur*.—This is sometimes called "*Kabuli Pashum*." It is used in the manufacture of the finer sorts of chogas, an outer-robe or cloak with sleeves, worn by Afghans and other Mahomedans of the western frontier.

(3). *Wahab Shâhi, or Kirmani Wool*.—The wool of a sheep found in Kirman, a tract of country in the south of Persia, by the Persian Gulf. It is used for the manufacture of a spurious kind of shawl cloth, and for adulterating the texture of Kashmere shawls.

(4). *The hair of a goat common in Cabul and Peshawur*, called *Pat*, from which a texture called *Pattu* is made.

(5). *The woolly hair of the camel*.—From this a coarser kind of choga is made.

(6). *The wool of the country sheep of the Plains*.—Regarding the production of wool in the Hymalayan or Sub-Hymalayan portion of the Punjab, the following is quoted from last year's Revenue Report.—"There can be no doubt that the valleys of the Sutlej, Ravee, Chandrabaga (or Chenab), Namisukh, and other tributaries of the Indus, supply grazing grounds not to be surpassed in richness and suitableness in any part of the world. The population inhabiting them are chiefly pastoral, but owing to sloth and ignorance the wool they produce is but small in quantity, full of dirt, and ill-cared for in every way." The government of the Punjab have made efforts to improve the breed, by the importation of Merino rams, but hitherto with little success. However, a truss of Merino wool produced in Huzara, a hill-district to the north-west of the Punjab, and sent to England in 1860, was there valued at 1s. and 6d. per lb.

RAW SILK.

Almost all the raw silk in the Punjab is produced in Bokhara, but it is not improbable that the submontane districts of the Punjab were formerly silk producing countries, as it is known that in the time of Justinian silk was produced in Sirhind. A series of experiments was made a few years ago by the Government of the Punjab, with a view of ascertaining whether silk-worms could be successfully reared in the plains, but the experiment was a failure, the heat and want of sufficient moist food having rendered the worms nearly unproductive. Mr. Cope, of Umritsur, who originated the experiment, has, however, again tried it with some success.

Raw Tussur silk is produced extensively in the Seonee district, but is not manufactured into cloth there. It is exported to Nagpore, where it is woven into native cloths, called "Tussur Sarees," &c. No further information can be given at present, as the trade is carried on by the Gonds, living in scattered jungles.

Tussur cocoons are found in large quantities in Perulia and Hazareebaugh.

Tussur silk is locally called "*Khosa*," "*Khoseare*." It is the product of the *Saturnia Mylitta*, moth-caterpillar. The cocoons are found in abundance throughout the forest jungles of Cuttack, and for the most part on the larger trees called the "*Asan*" (the *Pentoptera tomentosa*), the *Sal* or *Shorea robusta*, and less frequently on the common Indian plum or "*Barkolee*" tree. The wild cocoons are collected by the "Sahars" and other poor and half wild castes (whose villages are often met with in the heart of the jungles), and sold so many for the piece, to the best advantage, but at no fixed rates. Each cocoon being very carefully enclosed within two leaves brought together and made to wrap around it, it is almost impossible to discover by mere sight, on which trees cocoons are to be found. This is, therefore, done by observing the dung of the caterpillar under the tree. The eggs of the moth are also collected and preserved, and the caterpillar regularly reared and tended, in many parts in the hill tracts, on trees pruned and preserved for the purpose. The cocoons vary much in size and colour; and there is also a very perceptible diversity in the texture and glossiness of the raw silk, which most probably depends on the species of tree on which the caterpillar may happen to have fed. The same variety is observable in the female moths, which are of three or four different sizes and colours. The mode of winding off the thread does not differ from that pursued in the case of the ordinary silkworm cocoon proper.

PIGMENTS AND DYE COLOURS.

Lac or Lakhdye is the product of the lac insect. The sample in the Exhibition shows the material from which the dye is extracted, and consists of the wax also, enveloping the twigs round which the insect has formed it. The dye, whether it be the insect itself, or something produced by it, is found under the enveloping wax. This material is collected as far as can be ascertained, from the *Asan* and "*Burkobi trees*," by no means uncommon in the jungles. The process by which the dye is extracted is as follows:—

The wax is bruised and boiled, and the colouring matter is thus taken up by the water, which is drained off, and probably to some extent evaporated. The material to be dyed is then dipped in the water, taken out dried, and again dipped and dried, and so on, till the required colour is obtained. To preserve the dyeing matter for future use and sale, circular wads of cotton are dipped in the coloured liquid, then dried, and the process continued till a high colour is obtained. It is in this shape that the dye is sold in the markets.

This substance is gathered in all the tributary states, and a great deal of it brought down from Sumbulpore. Leather is coloured with this dye. Most of the vegetable dyes, it may suffice to say, are treated much in the same way as the above, with the addition of some astringent.

The lac is purified after being collected from the tree.

It is dissolved in boiling water, and passed through a cloth and spread to dry. Used for native women's bangles; one seer per rupee.

The *Cæsalpinia Sappan* grows not only in the jungles in a wild state, but is also grown in various localities for the sake of the dye.

The *Soorboolee* (botanical name unknown) producing a fast dye of a golden tinge is extracted from this plant, which is a weed growing on sandy spots along the south coast of Pooree. The dye is not used in the district, as the plant is not found in sufficient abundance. The stems readily yield a colour in water.

Kamla Goondie, also locally known as the "*Kat soon-dra*," produces a fast dye, applicable to silks and woollens. It is the bloom of a wild fruit. This fruit is about the size of a pea, and grows in large clusters in bunches, and is common in the interior jungles of the district. The fruit is gathered and put into a basket, and well shaken over a cloth spread beneath. The bloom is thus detached and falls through the loosely woven bottom of the basket on to the cloth, and is thus collected. The dye is a bright, golden colour.

A red dye, called *Neepa Tsa-gyee*, is used by the Burmese to dye their cloths.

The leaves of the *Ruellia* are boiled in water, when the decoction gives a blue colour to cloth, &c., but inferior to indigo.

Tackwood, called *Rinnay*, used for dyeing Phoongie (Priests) clothes with yellow orange colour; 5,000 maunds procurable, but more can be had if required. Price—5 Rupees per maund.

The Al root is cultivated at the villages of Kupsa, Mut-tound, Khunna, &c.: the whole extent of cultivation is only about 400 beegahs. The Humeerpore district is the great producing country for al, probably from there being greater facilities for irrigation than in this district. The plants come to maturity in three years. The roots are then dug up and sorted into three kinds, according to the fineness of the fibres. The fibres are then cut and beaten down well, and then ground to powder, which latter is used for the dye. The proportion of prepared fibre is equal to the raw material. The uses to which it is applied are dyeing a red colour, and as a remedy for tooth-ache, as well as for sprains of horses. The cost of the raw material is Rupees 35 per begah, and eight manuds are generally produced in that area of ground. The cost of the prepared fibre is 1 Rupee per maund. It is transported on carts, horses, and bullocks to Banda and Rajapore for export to other parts of India, and the cost of transport is about 8 annas per maund.

Vegetable green dye is made from the leaves of a shrub growing very luxuriantly at Malda; the leaves yield the dye copiously, which readily attaches itself to cloth, flannel, silk, &c. *Directions*.—Dip a bit of cloth into the dye when perfectly dry; pass it quickly through a bath of diluted sulphuric acid; immediately after, into a strong solution of soda, when it will become a permanent green, effectually resisting the action of soap and water. Passing the cloth through the diluted sulphuric acid bath instantly changes it to a pink; soda sends it back to green. If a darker colour is required other mordants must be used, zinc acetate of copper, &c., without sulphuric acid.

Leaves of the green dye, when dried in the oven, will keep without deteriorating for any length of time.

Dissolve in water, then dye a bit of cloth in it well; when dry, dip it in a solution of acetate of copper. Cloths have been dyed with it in the following manner:—

1st.—Make the mordant of the diacetate of copper with lime; saturate a bit of cloth well in this.

2nd.—Make a thick solution of the leaves in cold water, rub the cloth with mordant; when dry dip well in this, hang up to dry; if not deep enough, repeat two or three times. If a bit of cloth is boiled in a solution of the leaves of the green dye itself, it becomes a fast colour, soap and water acting as its mordant. The annexed is a bit of cloth boiled in a solution of the leaves, and well washed with soap and water.

Some powder and a cake or two of excellent yellow dye from the petals of a flower giving out the dye largely, and at once attaching itself to cloth permanently, without mordants. It can be had abundantly, and collected with greater facility than safflower. Dissolve and boil in hot water, then dip the cloth or silk into it.

TANNING SUBSTANCES.

Tari, from Chittagong, is the pod of a leguminous plant, which grows abundantly in the Hills, and is useful for tanning.

Oom Tari is the produce of a palm which grows in this district, and is susceptible of the same as an ordinary tari.

Gutteah is another tanning substance. It is a bush that grows on the sides of creeks and rivers, in low ground, which is inundated with the spring tide. It is cut for firewood, and the fishermen and shoe-makers purchase it, and take the bark off to lay their fishing nets and leather, and afterwards sell the wood posts for firewood.

Terminalia Belerica, "Bahara," *Terminalia Chebula*, "Harida," and *Phyllanthus Emblica*, "Ola," are the fruit of wild trees very common in the jungles; they all yield an astringent juice. In native medical works they are conjointly referred to as the triphul or three fruit, and prescribed whenever an astringent is or is supposed to be indicated. The principal use, however, of this fruit, is in connection with the preparation of leather, in tanning, and blackening processes. *Terminalia Chebula* and the bark of the *Cassia Fistula* are used in the preparation, which is applied to ordinary hides, after they have been taken out of the lime bath.

The bark of the *Cassia Fistula*, locally *Soona Rea Chali*, is used in tanning leather. The tree is abundant in the jungles of the Tributary Mehals.

Terminalia Augustifolia, *Acacia Arabica*, *Quercus Infectoria*, *Nyctanthes Arborescens*, and *Acacia Catechu*, are substances used by native tanners in Calcutta.

BRITISH ASSOCIATION, CAMBRIDGE.

MONDAY, OCTOBER 6, 1862.

ON MACHINERY FOR COMPOSING AND DISTRIBUTING TYPE.

The following paper, by Charles Hart, was read in Section G:—

The composition of type consists in arranging the different characters in words with proper "spaces" between them, and again in arranging the words so formed in lines of any required length. The latter part of the process is technically called "justifying."

After the type has been used in the press, it becomes necessary that each character, or "sort," should be restored to its proper position in the "case," and when undergoing this process, the types are said to be "distributed."

This branch of industry is one of the very few in which the ingenuity of man has hitherto failed to effect any economy, unless attempts which have been very recently made to accomplish that desirable end shall prove successful. At this day, as in the days of Guttenberg and Caxton, the composition is effected by picking the types with the fingers out of the "case," and the distribution is accomplished by reversing that primitive operation.

But human ingenuity, if hitherto unsuccessful, has not been entirely idle in this matter. The International Exhibition contains no less than three machines, or rather sets of machines, for composing and distributing. They are known as the machines of Young, of Delcambre, and of Mitchel.

The last-named machines have not only been rewarded with a medal at the International Exhibition, but have been adopted by several printers in England, Scotland, and America. They may, therefore, be considered to have established some claim to the notice of those who are specially interested in the diffusion of knowledge.

The composing machine is in shape a right-angled triangle, placed horizontally. There is a key-board at one of the sides, and parallel with, and close to this key-board, there is a small iron shaft, set in motion by steam power, causing a number of parallel bands of tape to move uniformly away from the key-board, and in a direction perpendicular to it. The several characters, or "sorts," are placed in brass slides, which are ranged in a line commencing at the right of the operator (who faces the key-board), and running across the triangle until it almost bisects the other side. In addition to the parallel bands above-mentioned, which all move with uniform velocity, there is another band, called the "main band," running along the hypotenuse of the triangle, which is greater in length than any of the others, and also moves with greater velocity. Under each of these slides one of the parallel bands is constantly kept moving, ready to convey its proper type to the main band; and, on its arrival there, the type falls into its proper place in the word. The duty of the main band is to carry the words thus formed on to a wheel which places the type standing upright, and pushes forward the line as fast as it is formed.

One of the principal difficulties which inventors have to contend against in dealing with this subject, was to find some means by which the types could be made to arrive at their destination in the exact order in which they are struck out by the keys. Mr. Mitchel has achieved this result by causing the several types to move with a speed proportioned to the distance over which they have to travel.

To understand this, it would be necessary to confine our attention to the triangle formed by the line of the slides in which the types rest, the lowest and longest of the parallel bands, and the main band. The side of this triangle, formed by the main band, is about $2\frac{1}{2}$ times as long as the side formed by the parallel band. The main band moves at a speed $2\frac{1}{2}$ times as great as the parallel bands. It follows necessarily that if two types are struck out at the same moment from the opposite ends of the line of slides, both must arrive together at the point of junction of the two bands, one being carried over a space $2\frac{1}{2}$ times as great as the other, and at a speed $2\frac{1}{2}$ times as great. By this very simple contrivance the types are made to arrive infallibly in the order in which they are struck out, however rapid may be the touch of the operator.

The machine has accomplished its duty when the types have been received from the main band by the "setting wheel," which turns each letter into a vertical position and, at the same time, pushes forward the line. The long line thus formed is transferred to a justifying stand, and, when this is filled, the operator proceeds to "justify," leaving another workman to take his turn at the keys. One composing machine, thus worked by two operators, is capable of setting up 50,000 "ens" of corrected matter, being about the ordinary work of four men.

The distributing machine exhibits even greater ingenuity than its companion. When one considers the great variety of "sorts" to be dealt with, amounting to about one hundred and twenty in all, and, further, their great diversity in thickness, it is difficult to conceive that, by a merely mechanical process, each type can be separated from the line in which it is placed, and carried to a receptacle in which it finds no type save one of its own kind.

I have indicated two difficulties, one arising from the diversity of thickness in the types, the other from the variety of sorts. The first is encountered in the separation of each type from the line, the second in conveying each type to its appropriate receptacle.

As an example of the first, let us suppose the word "mill" presents itself to the vibrating piece of steel which separates the letters. The first letter, *m*, equals in thickness the three following letters, *ill*, taken together. It becomes necessary in this case to prevent the machine from mistaking those three letters for one, and so cutting them off all at one stroke.

This is effected by means of a nick inserted in the side or edge of the thick type, into which a small bevelled stopper fits, allowing the type to advance further than it could without such nick. The following letter, *i*, having no such nick, is not permitted to advance so far, and so is cut off singly, the letter *l*, which comes next, not being allowed to come within the range of the vibrating cutter, and so on.

In this way, at the first stage of the process, the machine is able to discriminate between the thick and the thin sorts, taking from the line one type at a time and no more.

The nick above mentioned is confined to the thicker sorts of type, and may be called the "separating nick," to distinguish it from those other nicks which are made in the types for the purpose of determining the receptacles to which they are to be severally conveyed. For this latter purpose each type is furnished with one or two nicks, according to the class to which it belongs. There are four classes; the first having only one nick, the other three classes two nicks.

When the type has been separated from the line in the manner above described, it falls upon a brass grooved wheel, whose periphery slopes like the side of a cone. The type, dropping into one of the grooves, becomes suspended by means of its nick on a pin placed at the bottom of the groove, the ends of the type projecting below the under surface of the wheel at distances varying according to the position of the nick. At corresponding distances under the wheel there are small stationary pieces of steel which meet the projecting end of the type as it is carried down, raise it off the pin, and allow it to drop into its proper receptacle. A number of small pushers, worked by an eccentric within the wheel, push forward the type as they fall, and the several characters are thus placed in lines, each "sort" or character by itself, ready to be transferred to the slides of the composing machine.

The keys of the composing machine deal only with about forty "sorts," and so far it would seem to be imperfect. But in answer to this objection it is alleged that the sorts not worked by the keys are comparatively so rarely used that in an average page of printed matter they will not amount to five per cent. of the entire. Those sorts, namely, capital letters, italics, and numbers, are picked up by the operator from a case lying before him on the machine, and dropped into a slide, by which they are conveyed on to one of the belts, and are so carried on and set up by the machine in their proper place and order.

In addition to the saving of labour effected by these machines, it is alleged that the wear of type is diminished by their use, that a complete mastery of the machine can be acquired by a smart boy or girl in the course of a few months; and, finally, that it substitutes an occupation, light, diversified, and easily acquired, for one which is peculiarly laborious and unhealthy, and to the acquisition of which a period of five or seven years is usually devoted.

ARTIFICIAL STONES.

The following is a more detailed and a corrected account of the experiments referred to at the conclusion of the paper on this subject which appeared in last week's *Journal* :—

The transverse strength was tested in the following manner :—

A parallel bar of "Ransome's Concrete Stone," measuring 4 inches X 4 inches, and resting upon iron frames, so as to bear 1 inch on the iron at each end, with 16 inches clear between the supports, sustained a weight suspended from the centre of	lbs.
Whilst a bar of Portland stone of the same dimensions, and treated similarly, broke with...	2,122
	759½

The Adhesive power was proved upon pieces of stone notched for the purpose; the sectional area of which at the weakest part was 5½ inches.

The specimen of Ransome's Concrete Stone sustained.....	1,980
Whilst Portland stone, of same dimensions, and treated similarly.....broke at	1,104
Bath ditto ditto ditto	796
Caen ditto ditto ditto	768

A 4 inch cube of Ransome's Concrete Stone was found to sustain a weight of 30 tons before it was crushed.

ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

The engineer's monthly report, made Tuesday, September 30th, 1862, states as follows :—

"I am happy to be able again to report that no explosion has happened during the past month to any boiler under the inspection of this Association, neither has the occurrence of any in other quarters come to my knowledge.

"During the past month there have been examined 263 engines and 451 boilers. Of the latter 15 have been examined specially, 6 internally, 72 thoroughly, and 358 externally; in addition to which 4 of these boilers have been tested by hydraulic pressure. The following defects have been found in the boilers examined :—Fracture, 8 (1 dangerous); corrosion, 49 (8 dangerous); safety-valves out of order, 3; water gauges ditto, 14; pressure gauges ditto, 4; feed apparatus ditto, 3; blow-off cocks ditto, 16 (1 dangerous); fusible plugs ditto, 5; deficiency of water, 1; blistered plates, 3 (1 dangerous). Total, 106 (11 dangerous). Boilers without glass water gauges, 5; without blow-off cocks, 17; without back pressure valves, 25.

"Two boilers have recently been met with, neither of which was fitted with its own separate safety-valve, but both were dependent on a single one placed upon the steam pipe, the communication between which and each boiler was conditional on its junction valve being open, so that had the attendant at any time inadvertently left this valve screwed down—on getting up steam for instance on a change of boilers—the whole steam pressure must have been bottled up without chance of escape.

"FEED BACK PRESSURE VALVES.—Some of our members do not appear to be fully aware of the importance of fixing a feed back-pressure valve to each of their boilers, and therefore the following instance, lately met with, of the inconvenience arising from the want of them, may be given.

"Four boilers, set side by side and connected together, were working under their ordinary circumstances, when one of them vomited its water through the feed pipe into the adjoining one, draining itself and over-charging the other. The danger of this, if not immediately detected, with a fire in active operation, will at once be seen. It is, however, by no means an uncommon occurrence where back-pressure valves are omitted, especially where any thickening matter exists in the water, which tends to lift it and cause priming, under which circumstances the water has been found to rush backwards and forwards alternately between boilers working in connection. The back-pressure valve prevents this: the water from the feed pump operating underneath and raising it, while the pressure from the boiler operates on the top and closes it. Necessary as these valves are to the safety of boilers when working in a series, they should not be neglected in the case of those working singly, not only when fed by a pump, but also when fed direct from the waterworks main: in the first case, in order that the pump-valves may be accessible when steam is up, and in the second, that the reflux of hot water from the boiler may be prevented either on the bursting of the pipe or other cause. These valves should be placed immediately upon the shell of the boiler, and not at a distance from it, as is sometimes the case, since scalding might ensue should any joints

break in the intervening length of pipe, while repair could not be effected without letting the pressure down. For the same reason the feed-stop valve should not be interposed, which it too frequently is, between the back-pressure valve and the boiler, since a disarrangement of the stop valve may entail an entire stoppage, which, had the feed back-pressure valve been placed immediately upon the shell, could easily be rectified with steam up.

"In the construction of this valve care should be taken to limit its rise, for want of which simple precaution some of them have proved to be entirely useless, the water passing freely from one boiler to the other as if the valve were not there. Its most convenient position is at the front end plate of the boiler, nearly on a level with the furnace crown. Its beat can then be heard at every stroke of the engine, and if a screwed spindle be added, so as to convert it into a combined feed-stop and back-pressure valve, which is the best arrangement, then the feed can be regulated without leaving the furnaces.

"BLOW-OUT APPARATUS.—A case of scalding has lately occurred in consequence of the failure of the blow-out apparatus of a boiler which was, however, not under the inspection of this Association.

"The manner in which blow-out taps are often strained with long levers in opening and closing, renders it a matter of surprise that fracture does not more frequently occur, and many have such inefficient arrangements for carrying off the waste water that it beats back with so much violence on the taps being opened, that their use is quite dangerous. Enginemen are in this way but too frequently scalded severely, and our own Inspectors sometimes meet with narrow escapes. Some taps are so inconveniently placed that the nut at the bottom of the plug is quite inaccessible, and thus becomes neglected, in consequence of which several cases have occurred of the plug being shot out by the force of the steam on being opened. Taps fitted with glands are safer as well as more convenient; they should, however, be made entirely of brass in the shell as well as in the plug, and be fitted with a suitable waste pipe. Those made of cast-iron in the shell and brass in the plug are generally found to be inconvenient, and sometimes dangerous, on account of the unequal expansion of the two metals, from which it is frequently impossible to close them, when the boiler becomes robbed of its water, and the fires have to be drawn to prevent injury to the furnaces.

"The case in question, however, was somewhat peculiar, and the fracture did not arise from either of the above causes. The blow-out tap was attached to the boiler by a cast-iron elbow pipe, and this pipe broke short off without warning, while the boiler was at its regular work and the blow-out tap not being touched.

"The cause of this appeared to be as follows:—Boilers, as has been previously stated in these reports, are too frequently considered to be in a state of rest when once set upon their brickwork bed; whereas, from the constant changes of temperature, and the consequent contraction and expansion that take place, not only in the boiler itself, but also in the brickwork, the whole is in a continual state of movement. It appears most probable that this action had in process of time induced a slight settlement of the boiler, and thus that a strain was brought upon the cast-iron elbow pipe, which being bound by the brickwork, consequently gave way. A torrent of hot water naturally ensued, which, unable to escape at the usual outlet, found its way into an adjoining building, where it partially flooded one of the floors, and two or three persons became scalded in consequence.

"PREVENTION OF INCRUSTATION.—It may be stated in brief that the scum pipes for surface blowing out, which have been recommended from time to time, for the prevention of incrustation in boilers, have now been adopted by several of the members, and have, for some time since, been in very successful operation. An early opportunity will shortly be taken of making more detailed reference to this subject; but, in the mean time, it may be stated

that a drawing of the arrangement adopted lies at the office for the inspection of the members, and that full particulars, both of the details of construction and results of working, will be given on application.

"HINTS TO MEMBERS ON LAYING DOWN NEW BOILERS.—There is one branch of the service this Association affords which the members do not avail themselves of as fully as they might—namely, that of consulting the records at the office before laying down new boilers or making alterations. Full particulars are kept, not only of the construction of the boilers under inspection, but also of the results of their working; and a consultation of these would frequently save unnecessary outlay, prevent failures of one being repeated by others, and place at the command of each member the experience acquired by the inspection of the whole number of boilers under the charge of the Association."

Home Correspondence.

PATENT LAWS.

SIR,—Will you allow me to call attention, through the *Journal of the Society of Arts*, to the following article from the *Penny Newsman*, presenting an example of considerable importance on the principle of the patent laws, in which the readers of the *Journal* are extensively interested. To the observations of the writer of the article in support of the principle of the protection of the labour of invention, whether by copyrights for designs, or by copyrights for books,—I would add in excuse for the neglect of men of genius and their families by society, that society has not time to attend to the multifarious claims of men of genius, or means to judge of them, or to apportion rewards, or to judge upon conflicting claims. Well devised copyrights and well adjusted patent rights, however rudely, are self-acting, so to speak,—in the apportionment of reward to the inventors, levying that reward as payment from those who benefit directly from the labour,—the consumers.

The case of Crompton is that of a class of men qualified to invent, but not to work inventions commercially. This case is met by commercial men of a new class, who turn inventions to account as a separate division of labour.

I am, &c.,—A MEMBER.

THE CROMPTON STATUE.

See nations, slowly wise and meanly just,
To buried merit raise the tardy bust.

"A few conscientious men at Bolton have raised a monument to Samuel Crompton, a native to whose inventions the town largely owes its prosperity, and, from that prosperity, many of the natives their existence. The history of Crompton, and his work, are interesting in a point of view in which they have not hitherto been regarded—viz., that of leaving the labour of invention and mechanical genius so to be rewarded by a sense of gratitude arising from a conscientious recognition of its value from those who are left free to avail themselves of the results of that labour; or of giving him who performs the labour of invention the exclusive right, for a term of years, to its product, under the patent law. Crompton was mainly dependent on the principle of the free use of his labour of invention by others, of a public recognition of its value, and the conscientiousness of those who used it; and his life was one of penury, almost a source of mendicancy and pauperism. Richard Arkwright was sharper, secured his labour of inventing—or of borrowing—by patent rights, fought for it, made those who used it pay for it, secured a princely fortune for himself, and left his family high positions of wealth and aristocratic influence—founded a great family, in short. So it was with Watt. We cannot discover that manufacturers or the nation were any the worse, or pros-

pered the less (even against foreign competitors who were free to use the invention), by the self-acting method of payment secured by patent laws, rough and imperfect though it be. The fate of the families of the unprotected labourers in invention is also suggestive on the other side, and is by no means creditable to our social sympathies. In France Crompton would have received first-class decorations, and, on proof of his poverty, provision as a right for himself; he would have been made a knight of the Legion of Honour, and as such his children would have been "the children of the country," for whose maintenance and education, whether male or female, first-class institutions are provided. The Order of the Bath, for distinguished civil as well as military service, is the order which in England is analogous to the Legion of Honour. The order comprises men of large families and very slender means, but there is no care, or provision, or privilege of the kind for their children. There were collateral descendants of Shakespeare and direct descendants of Milton in obscure poverty, as well qualified for distinctions as the descendants of peers; but they were never thought about, except by one or two solitary curious men. In this very instance of the inauguration of the statue of Crompton (who died only in 1827, in the very neighbourhood and town enriched by his labours), little thought appears to have been bestowed on the condition of his family, or on their claims to any position in the ceremonial. The *Manchester Guardian* states that "the fund for the erection of the statue which was inaugurated yesterday was obtained by subscription, and amounted to about £2,000. Yet, will it be believed, while this tardy recognition is being made of a national benefactor who was permitted to die in indigence, while mayors and wealthy cotton spinners ride in procession and talk of honouring themselves by honouring Crompton, who was the instrument of their fortunes, Crompton's surviving son, his grandchildren, and great-grandchildren were entirely uncared for by the committee of management and the corporate authorities? Mr. John Crompton, the youngest son of the inventor of the mule, was indebted to the kindness of a friend for a suit of clothes in which to be present at the inauguration. He was not invited to any of the festivities, nor were any of the inventor's descendants, of whom Dr. Crompton, of Cavendish-square, Manchester, is one (a grandson). Crompton's descendants number about half a dozen grandchildren and a dozen great-grandchildren, all of whom, with the single exception mentioned, are in poverty, or only a grade above it. The kindness of a gentleman in no way connected with the inauguration proceedings alone enabled them to celebrate the day by a better meal than usually falls to their lot. Where can we find a more glaring instance of popular ingratitude and of painful contrast than here—the memory of a poor deceased benefactor honoured, and his children neglected, if not despised?"

Has the cynic too truly summed up the wisdom of experience when he declared "money to be your only friend?" Must genius depend for its reward not upon the gratitude of mankind, but the firm grip of the law? The fate of this measureless benefactor of the human race, whose worth to England has been priceless, is at once a warning and a reproof. It demonstrates not merely the beneficence, but the necessity, of a legal protection to inventors for the fruits of their brain sweat. It proves that whether in arts, in letters, or in machinery, the public service itself is promoted by securing to the creative mind the exclusive temporary right to the first fruits of blessings it has called into being. Had Crompton been a patentee, the country would have been not less rich, and he a great deal richer. The neglect, the poverty, the obscurity, in the cold shade of which his life withered and lingered, are a scandal to the people who even now do but tardy justice to the memory of that gifted man, who lived to

'Read his history in a nation's eyes,'

but never to gild it by its gratitude."

Proceedings of Institutions.

CITY OF LONDON COLLEGE.—A public meeting was held at this College on Thursday evening, the 9th Oct., for the annual distribution of prizes and certificates to the students. Mr. Alderman W. A. Rose (Lord Mayor-Elect) was announced to take the chair, but he would have committed a breach of civic etiquette had he done so, and, therefore, he was reluctantly obliged to forego that pleasure. The Rev. CHARLES MACKENZIE, M.A., took his place, and said he deeply regretted the absence of Mr. Alderman Rose, who was not only a staunch friend to the College, and had stood up in the Common Council-chamber to support its claim to a grant, but was the very first to give his guinea annually towards its support. The present Lord Mayor, too, was entitled to their respect and gratitude, for he, when the College was in difficulties, cheerfully granted the Egyptian Hall for a public meeting in its behalf, and consented to act as treasurer to a fund designed to place it on a permanent foundation. After some further remarks upon the success of the college students, the nature and value of their studies, and the severity and fairness of the examinations both of the Society of Arts and the City of London College, the Chairman called upon the Rev. R. Whittington, M.A., the Principal of the College, to call up the young men to receive the prizes and certificates which had been awarded to them. The list of those awarded by the Society of Arts has already appeared in the *Journal*. The following is a list of Prizes and Certificates awarded by the City of London College:—Associate—Mr. T. Brodribb, E. G. Clarke, T. R. Howard, Warrington, W. Vaughan. Scholarship—J. H. Levy, with 1st Class Certificate Arithmetic, 1st do. do., Geometry, 3rd do. do., Book-keeping, 3rd do. do., Algebra. Lowth Prize—William Vaughan, with 1st Prize and 1st Class Certificate Mathematics, 2nd do. do., Book-keeping. Commercial Prize—H. L. Hughes, with 2nd Prize and 1st Class Certificate German, 1st do. do., French, 2nd do. do., Arithmetic, 2nd do. do., Book-keeping. English Essay Prize—J. Macrae. Principal's Prize—J. Macrae. Arithmetic, 1st Prize, Book-keeping, 1st Prize—W. G. Masham. Chemistry, 1st Prize—W. Meadows, with 3rd Class French. Drawing, 1st Prize—J. Appleton. German, 1st Prize—H. Hempleman, with 3rd Class Book-keeping. FIRST CLASS CERTIFICATES:—Arithmetic—T. J. Lloyd, A. B. Clementson (with 3rd Class Algebra). Algebra—H. Hoskins. Book-keeping—H. J. Garside, (with 2nd Class Arithmetic.) R. C. Bennett, A. Day, (with 3rd Class French.) Drawing—G. Foster. French, with honourable mention—J. S. Harding, (with 3rd Class Arithmetic). French—G. Dickenson. German—F. Bailey. SECOND CLASS CERTIFICATES:—Arithmetic—J. Brady, W. D. Ground (with 2nd Class Divinity and 2nd ditto English History), G. J. Stancliff, R. G. Webster (with 3rd Class French and 3rd ditto Mathematics). Book-keeping—R. G. Allardice, H. G. Crews, C. W. Webb. Divinity—A. Banister. Drawing—W. H. Gregory. French—C. Dix (with 2nd Class German), J. Pike. German—G. Worley. Greek—D. Harrington. Spanish—H. J. Sudell, W. H. Saunders (with 3rd Class French), J. Vickers. Hebrew—J. S. Stephens.—THIRD CLASS CERTIFICATES:—Algebra—C. M. Bayfield (with 3rd Class French). Arithmetic—A. Banister, H. G. Clarke, W. R. Clark (with 3rd Class French), C. Law. Book-keeping—J. S. Foster, J. J. Sones. French—T. G. Goalen (with 3rd Class German), J. Lewis. Geometry—L. A. Hoiderness. Latin—J. Cannon, R. G. Nash. Spanish—R. J. Lesslie. The scholarship won by Mr. Levy entitles him to £10, and a free admission to the college. His claim to these distinctions was established by obtaining the highest number of marks in the subjects taught in the college. It was stated that, among the eighty-two institutions that sent up candidates to the Society of Arts, the City of London was only beaten by one institution. The

Rev. W. WINDLE proposed, and Mr. E. CLARKE seconded, a vote of thanks to the Society of Arts. Mr. WINKWORTH said that on the part of the Council of the Society of Arts, of which he was now the oldest member except their venerable President, Mr. William Tooke, he was sure they would feel as much gratified as he was at finding that the system of Examinations they had originally inaugurated, and for which they were mainly indebted to his respected colleague, Mr. Harry Chester, had produced such excellent fruit, and was so highly appreciated by the students. The Crosby Hall Evening Classes, now the City of London College, had in former years largely availed themselves of these Examinations, and had carried off a considerable number of prizes and certificates, and on the present occasion he was delighted to see so large a number of students who came up to receive the prizes and certificates which were offered for competition by the Society of Arts and by the College. Nor was he by any means surprised that they were principally given for proficiency in those branches of education which were most useful to young men qualifying themselves for mercantile appointments. It was just what ought to be the case in this great emporium of commerce, where a knowledge of arithmetic, book-keeping, as well as of French, German, and other European languages, was so essential. Of the importance of the last-named subjects the International Exhibition afforded abundant evidence, for much inconvenience was experienced at stalls where English attendants were unable to explain to foreign visitors, who had business views in their inquiries, the peculiar merits of the goods or articles of taste they had in charge. And the same difficulty existed in the foreign departments, where the attendants could not speak English. On the whole, then, the results of the examinations since the establishment of the college were highly satisfactory and encouraging to the principal and lecturers, and most creditable to the students themselves. On the part of the Society of Arts, he begged to thank the meeting for the vote he had risen to acknowledge. The Rev. R. WHITTINGTON, Principal, proposed a vote of thanks to the hon. examiners of the college, which was seconded by Mr. W. VAUGHAN, and acknowledged by Professor CASSAL, of University College. A vote of thanks to the Lecturers and Professors was then proposed by Mr. C. W. PRICE, V.P., seconded by Mr. J. H. LEVY, and responded to by Mr. P. L. SIMMONDS, F.R.S., and Mr. F. REYNOLDS. Mr. MONTAGUE GORE, V.P., then moved, and the Rev. M. W. LUSIGNAN seconded a vote of thanks to the Chairman, which was put to the meeting by the Rev. J. MASKELL, Hon. Sec., and carried unanimously. The proceedings then terminated.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, October 3rd, 1862.]

- Dated 19th September, 1862.*
2598. J. Smith and W. Smith, Collyhurst, near Manchester—An improved combination of machinery or apparatus for doubling, measuring, and plaiting woven fabrics.
2570. D. C. Bridge and J. Dyson, Halifax—Imp. in the formation of boilers to be employed for warming buildings and similar purposes.
2572. F. Savage, Lynn—Imp. in traction engines.
2576. C. Chinnock, Queen's-road-west, Regent's-park—Imp. in the construction of corkscrews.
2578. E. Feis, 8, Sise-lane—Imp. in the construction of locks, catches, or fastenings for purses, bags, or other receptacles. (A com.)
- Dated 20th September, 1862.*
2580. H. R. Fanshawe, 3, Loaden-hall-street—Imp. in the mode and means used in fishing in seas, rivers, and other waters.
2584. A. Prince, 4, Trafalgar-square—Imp. in steam boiler and other furnaces, and in apparatus for feeding the same. (A com.)
- Dated 22nd September, 1862.*
2586. J. Sanderson, Clerkenwell—Imp. in writing desks and cases.
2590. M. Vogl, Sambrook-court, Basinghall-street—Imp. in fastenings for leggings and other articles of wearing apparel.

[From Gazette, October 10th, 1862.]

Dated 12th July, 1862.

2012. D. Bateman, Low Moor, near Bradford—Imp. in the manufacture of "card cloth," used for carding wool and other fibrous substances.

Dated 28th July, 1862.

2127. J. Walton, 335, Strand, and J. Moore, 11, Upper Berkeley-street, Portman-square—Imp. in the mode of ventilating and heating rooms, Turkish baths, hothouses, and buildings of all kinds.

Dated 11th September, 1862.

2503. L. C. Hoyau, Paris—An improved portable apparatus for marking time.

Dated 15th September, 1862.

2531. J. Pender, Manchester—Imp. in hoops for fastening bales, and in machinery or apparatus for making the same.

Dated 16th September, 1862.

2540. G. L. Lee, Holborn-hill—Imp. in the manufacture of metallic shutters for shop fronts, doors, and windows.

Dated 17th September, 1862.

2548. S. C. Keeler, 29, Percy-street, Tottenham-court-road—Imp. in veneer cutting machinery. (A com.)

2554. G. Haseltine, 100, Fleet-street—Imp. in apparatus for the manufacture of gas from petroleum oil and water, and from cannel coals, bituminous coals, schists, tar, crude coal oil, or other hydro carbons and water. (A com.)

Dated 18th September, 1862.

2557. P. H. Whitehead, Rawtenstall—An improved support or stand for casks, barrels, or other similar vessels.

2559. W. Todd and J. Todd, Heywood, Lancashire—Imp. in machinery or apparatus for collecting waste or fly from spinning machinery, whether for cotton or any other fibrous material.

2561. G. S. Moore, Sunderland—Imp. in ship building.

Dated 19th September, 1862.

2563. T. Watts, Carisbrooke, Isle of Wight—Imp. in combined thrashing machines.

2565. W. Glass, 37, Princes-street, Stamford-street, Lambeth—Imp. in the treatment of sulphuret of antimony, and in obtaining products therefrom.

2566. E. de la Bastida, 43, Hart-street, Bloomsbury-square—An improved cover for chimneys, adapted to prevent them from smoking, and to facilitate the extinguishing of fires therein. (A com.)

2569. J. Bouvet, La Rochelle, France—An improved mode of closing or sealing tin preserve boxes.

2573. W. M. Cochrane, Clattern-cottage, Kingston-on-Thames—Imp. in securing the bolts and nuts of railway fish plates.

2575. R. R. Jackson and J. Coupe, Blackburn—Imp. in looms for weaving.

2577. G. Maw, Benthall Works, near Broseley, Shropshire—Imp. in the manufacture of tessere and other mosaic inlays.

Dated 20th September, 1862.

2579. P. L. Forestier, Paris—Imp. in photographic albums.

2582. L. Dixey, 21, King's-road, Brighton, and G. Smith, Angmering, Sussex—A new or improved method of tinting, by lithographic printing, photographic portraits and back grounds, and embossing the same.

2583. J. Wilson, North Brixton, Surrey—An improved composition for preventing and removing incrustations in boilers.

Dated 22nd September, 1862.

2585. C. Mertens, Jubilee-place, Chelsea—Imp. in machinery or apparatus for scutching and dressing flax, hemp, or other fibrous materials.

2589. W. M. Cranston, 58, King William-street—Imp. in machinery for reaping and mowing corn and other crops.

Dated 23rd September, 1862.

2592. R. Fairburn, Burley, near Otley, Yorkshire—Imp. in machinery for combing wool or other fibrous substances.

2593. T. Knowles, J. Houghton, W. Knowles, and W. Houghton, Gomersal, Yorkshire—Imp. in looms for weaving.

2594. C. Pontifex, 154, St. Paul's-road, Canonbury—Imp. in means or apparatus for removing or expressing beer from yeast or from hops.

2595. W. Dobson, Nottingham—A new method of producing various colours on lace or other fabrics.

2596. J. J. N. Micas, of Chateau de By, France—An improved railway brake.

2597. R. A. Brooman, 166, Fleet-street—Imp. in lighting apparatus. (A com.)

2598. R. A. Brooman, 166, Fleet-street—Imp. in photographic apparatus. (A com.)

2599. S. H. Laurent, 29, Boulevard St. Martin, Paris—An improved railway brake.

Dated 24th September, 1862.

2601. J. Farran, Manchester-road, Bolton-le-Moors, Lancashire—Certain imp. in looms for weaving.

2603. W. Taylor, Chester—Imp. in blacking or polish.
 2604. R. A. Brooman, 166, Fleet-street—An improved composition for painting. (A com.)
 2605. W. Maddick, jun., Liverpool—An improved process or method of treating and preparing madder for dyeing purposes.
 2606. D. Posener and A. Posener, Rupert-street, Haymarket—Imp. in the manufacture of inda-rubber add other tobacco pouches or purses.
 2607. R. R. Jackson and A. I. Jackson, Blackburn—Imp. in the preparation and treatment of flax and other fibrous materials to be subsequently operated upon by machinery employed for preparing and spinning cotton.
 2608. R. R. Jackson and A. I. Jackson, Blackburn—Imp. in machinery for cutting fibrous and other materials.
 2609. W. Upfill and W. Asbury, Birmingham—Imp. in the manufacture of metallic bedsteads, part of which imp. are also applicable for ornamenting tubes and curtain and cornice poles.
 2610. T. Edwards, Blackheath, Kent—An improved mode of preparing fibrous materials for spinning.

Dated 25th September, 1862.

2613. T. Kennedy, Kilmarnock, Ayr, N.B.—Imp. in taps or valves.
 2615. J. Raywood, Sheffield—Certain imp. in the construction of gas apparatus for the prevention of fraud, and for economising the consumption of gas.
 2616. J. R. Breach and E. B. Pyesmith, Leeds—An improved machine for reducing or equalising the length of animal or vegetable fibres.
 2617. J. Eardley, Woodville, Leicestershire—Imp. in pitch pipes or tuning pipes.
 2618. W. Lea, Wolverhampton—Imp. in hinges for French casements.
 2619. A. Potter, Birmingham—Imp. in electro-magnetic engines.
 2620. P. Wright, Dudley, Worcestershire—Imp. in the manufacture of parallel vices.
 2621. J. R. C. Taunton, Birmingham—Imp. in the manufacture of metallic bedsteads, cots, and couches.
 2622. E. C. Muntz, Birmingham—An imp. or imps. in the manufacture of axles.
 2623. T. R. Harding, Leeds—Imp. in machinery for opening, cleansing, and carding fibrous material.

Dated 26th September, 1862.

2625. J. J. Bates, Birmingham—A new or improved window sash fastener and guard.
 2626. E. Dixon, Wolverhampton—Imp. in machinery and furnaces used in the manufacture of welded iron tubes.
 2627. C. D. Abel, 20, Southampton buildings, Chancery-lane—A new or improved purifying and preservative lotion for the mouth. (A com.)
 2628. J. Milner, R. D. Milner, and F. Hurd, Wakefield—Imp. in apparatus applicable to machines for preparing wool, flax, and other fibrous substances, parts of which are also applicable to machines for other uses.
 2630. W. M. Cochrane, Clattern-cottage, Kingston-on-Thames, Surrey—Imp. in securing the bolts and nuts of railway fish plates.

Dated 27th September, 1862.

2631. F. R. Stack, Whetstone—Imp. in escalading apparatus for military purposes.
 2632. J. Crosby, Shepley Hall, Audenshaw, near Manchester—Imp. in carding engines.
 2633. H. Hutchinson, No. 26, Rue Notre Dame des Victoires, Paris—Imp. in machinery for covering wire with india-rubber and gutta percha, and similar gums and compounds thereof, and for manufacturing tubes and other articles of such gums and compounds. (A com.)

Dated 29th September, 1862.

2635. J. C. P. Bauchaard, Nouvion en Thi-rache, L'Aisne, France—A twice transversal encoding trough.
 2636. H. Baun, Elberfeld, Prussia—Imp. in the manufacture of moreens and such like fabrics.
 2637. J. Brown, Middleton—Certain imp. in carding engines employed for carding cotton and other fibrous substances.
 2639. M. Puddefoot, Blisset-street, Greenwich—Imp. in apparatus for tilling land.
 2640. W. B. Lord and F. H. Gilbert, Sandgate, Kent—Imp. in loading fire-arms, and in blasting.
 2641. W. E. Gedge, 11, Wellington-street, Strand—An improved furnace for casting steel. (A com.)
 2643. H. Hirsch, 65, Bridge-road, Lambeth—Imp. in apparatus for showing combinations of colours.
 2644. Rev. H. Moule, Fordington Vicarage, Dorchester—Imp. in heating frames and the beds of hot-houses, also in heating hot houses and other buildings used for growing plants, and for other purposes.

2645. H. Ellis, Bangor, North Wales—Imp. in the manufacture of compounds of silica, and in the application of certain compounds of silica to mineralise woven fabrics, paper, and paper pulp, to harden and preserve stone and cement in the production of artificial stone and paint, and in the production and glazing of porcelain and such like manufactures.
 2646. J. Bucknall, Boston, Lincolnshire—Imp. in the construction of horse hoes.
 2647. Capt. J. Addison, St. Heliers, Jersey—Imp. in moorings or apparatus for securing articles, applicable also to the fixing of chairs for railways.
 2648. R. A. Brooman, 166, Fleet-street—Imp. in saddle trees and collars. (A com.)
 2649. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in shells for war purposes. (A com.)
 2650. W. Carrick and W. Carrick, jun., Carlisle—Imp. in felting apparatus.

Dated 30th September, 1862.

2652. E. J. M. Le Breton, Neuilly-sur-Seine, near Paris—An improved propeller for boats and ships.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

2656. G. Haseltine, 100, Fleet-street—Imp. in the means for and mode of warming and ventilating buildings. (A com.)—1st October, 1862.

PATENTS SEALED.

[From Gazette, October 10th, 1862.]

- | | |
|--|--|
| 10th October. | 1132. S. Rideal and R. Shepherd. |
| 1048. E. Butterworth. | 1133. W. Clark. |
| 1052. J. Howard, E. T. Bousfield, and T. Phillips. | 1134. J. C. Rivett and J. M. Hetherington. |
| 1053. I. Whitesmith. | 1135. R. Wedgwood. |
| 1055. N. Nussey. | 1138. J. S. Phillips. |
| 1058. E. Drewett. | 1145. E. Loysel. |
| 1062. E. Peyton and W. F. Batho. | 1148. A. N. Wornum. |
| 1063. J. F. Spencer. | 1150. H. Lumley. |
| 1075. R. A. Brooman. | 1168. S. S. Putnam. |
| 1076. R. A. Brooman. | 1171. A. Warner. |
| 1080. T. H. Bennett. | 1174. R. Boby. |
| 1081. F. A. Le Mat and C. F. Girard. | 1179. G. H. Birkbeck. |
| 1086. J. Platt and W. Cheetham. | 1192. W. Haggett. |
| 1087. J. Platt & W. Richardson. | 1193. H. Wheatley. |
| 1090. T. W. Gray. | 1194. J. Bond. |
| 1091. F. C. Phillipson. | 1204. R. Zimara. |
| 1096. T. Edwards & J. Harrison. | 1230. W. Clark. |
| 1097. J. Barbour. | 1235. G. Bischoff, jun. |
| 1100. D. Stott. | 1268. G. Davies. |
| 1110. J. H. Johnson. | 1295. R. Walker. |
| 1120. W. Harling, J. M. Todd, and T. Harling. | 1333. F. Marrel. |
| 1122. J. Murphy. | 1506. F. E. Sickels. |
| 1125. J. L. Perin. | 1529. H. B. Barlow. |
| 1128. R. A. Brooman. | 1833. J. Anderton. |
| 1129. R. A. Brooman. | 1874. G. Peterson. |
| | 2007. T. Hill. |
| | 2230. G. Haseltine. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, October 14th, 1862.]

- | | |
|--------------------|---|
| October 6th. | October 10th. |
| 2271. G. A. Smith. | 2336. W. Burgess. |
| 2243. W. Clark. | October 11th. |
| October 7th. | 2316. J. Skertchly. |
| 2331. T. Twells. | 2338. T. Vicars, sen., T. Vicars, jun., T. Ashmore, and J. Smith. |
| October 8th. | 2345. J. Jack. |
| 2334. W. Prosser. | 2367. W. E. Newton. |
| October 9th. | |
| 2320. J. Carriek. | |
| 2343. G. Price. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, October 14th, 1862.]

- | | |
|--------------------|--|
| October 6th. | 2327. H. Bessemer. |
| 2243. W. Rothera. | October 10th. |
| October 8th. | 2309. W. Cotton. |
| 2317. H. Bessemer. | October 11th. |
| 2319. H. Bessemer. | 2553. J. Wilkinson, sen., and J. Wilkinson, jun. |
| 2321. H. Bessemer. | |
| 2325. H. Bessemer. | |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4513	Oct. 1	Label, Card, and Plate Affixer	Richard Sill, jun.	Birmingham.
4514	" 3	A Locket or other Article of Jewellery ...	Reuben and George Phelps ...	73, Spencer-street, Birmingham.

Journal of the Society of Arts.

FRIDAY, OCTOBER 24, 1862.

COUNCIL.

The following Institutions have been taken into Union since the last announcement :—

- Banbridge, Literary and Mutual Improvement Society.
- Bilston, Institute.
- Dudley, Mechanics' Institution.
- Glasgow, Evening Science Classes, Carlton-place Secu-
lar School.
- Westminster, Working Men's Club and Reading Room.

INTERNATIONAL EXHIBITION OF 1862.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty's Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty's Commissioners and of the Juries,

and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s. ; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

It was the intention of the Council to issue the volume complete in the early part of September, but as several of the Reports have not yet been received by Her Majesty's Commissioners, the completion of the entire work has been unexpectedly delayed; the Council, however, unwilling to defer the publication of the Reports already completed, have issued to the subscribers those that have been received up to the present time. When all the Reports are delivered, the parts now issued to subscribers will be exchanged, if uninjured, for the perfect volume, bound or unbound, as desired. Individual reports are sold separately; for prices see advertisement.

INTERNATIONAL EXHIBITION OF 1862.—VISITS OF SCHOOLS.

The following is a continuation of the Schools reported to Her Majesty's Commissioners as having entered the Building from the 13th to the 16th of October :—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.	
Oct. 13	Northwick-terrace ...	Private	Mrs. H. Stewart.	15	231	
" "	Banstead	National	Subscription	58		
" "	Northants	Lowick Endowed	W. B. Stopford, Esq.	18		
" "	Lewisham, Kent. ...	Congregational... ..	Subscription	25		
" "	Kent	Broadstairs... ..	Rev. E. F. Newell	21		
" "	Saffron-hill	Sunday.	Miss Pullen.	10		
" "	Wapping	St. John's Parochial.	Subscription	63		
" "	{ Merroun, near }	Parochial	J. W. Thrupp, Esq... ..	21		
" "	{ Guildford. ... }					
" 14	Spitalfields	Christ Church	Rev. J. Peterson.	110	533	
" "	Richmond	St. John's District	Subscription	32		
" "	Lambeth	All Saints' National... ..	Messrs. T. and C. Lucas... ..	120		
" "	Hatfield	Woodhill	Managers	27		
" "	Bishopsgate-street ...	Sabbath and Evening Adult	Lady de Rothschild... ..	33		
" "	Windsor	St. Mark's... ..	G. Moffatt, Esq., M.P.	109		
" "	East Hendred	Church	Rev. A. Pott	15		
" "	Clapham	Parochial	Rev. W. H. W. A. Bowyer.	28		
" "	Chiswick	National	Miss Hamilton	41		
" "	Bayswater	St. Matthew's Orphans Home.. ...	Miss Green.	18		
" 15	Richmond	St. John's	Subscription	25		
" "	Chelsea	St. Luke's... ..	Subscription	66		
" "	Isleworth	Endowed National	Subscription	120		
" "	Dulwich	National	Rev. J. R. Oldham	84		
" "	Buckinghamshire ...	Mentmore	Lady de Rothschild... ..	28		
" "	Brixton-hill.	British	Committee	57		
" "	Mill-end	St. Peter's Church	Subscription	30		
" "	Hill-street, Dorset-sq.	Cripples' Home	J. Marlan, Esq.	51		

RETURN OF SCHOOLS (*Continued*).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
" "	Beddington, Surrey...	National	A. Smee, Esq.	98	1,012
" "	City of London...	4th National	Subscription	111	
" "	Walham-green	St. John's National...	Rev. W. Garratt.	230	
" "	Forest-gate, Essex ...	Industrial	Committee	63	
" "	Victoria-park	St. James's... ..	Individual Subscription ...	49	
" 16	Park-road, Lambeth...	British	Subscription	129	
" "	Stepney	St. Peter's... ..	Subscription	32	
" "	Covent-garden	St. Peter's National...	Subscription	32	
" "	Walworth	South-street	Miss Bevington... ..	27	
" "	Brixton-hill	Wesleyan Day... ..	Committee	94	
" "	Edmonton... ..	Parochial	Subscription	137	729
" "	Egham, Surrey	Coopers' Company	The Governors... ..	78	
" "	South London	Shoe-blacks	T. G. Payne, Esq.	15	
" "	Marylebone..	St. Mary's	Subscription	69	
" "	{ Vincent - square, } Westminster... ..	St. Mary's... ..	Subscription	37	
" "	Leicestershire	Kibworth	Rev. M. Osborn	30	
" "	Nutfield. Red-hill ...	Sunday	H. E. Gurney, Esq.	11	
" "	Clapton	London Orphan Asylum...	Committee	23	
" "	Holloway	Manor House	Dr. Dukes	15	

VISITS OF WORKMEN.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building from the 13th to the 17th of October:—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
Oct. 13	20th Kent Rifle Band	Dartford	{ Messrs. J. B. White and } Brothers	16
" "	Employés at Cement Manufactory...	Dartford	{ Messrs. J. B. White and } Brothers	400
" "	Gas Work Operatives	Banbury, Oxon	The Directors.	11
" "	{ 7th Company, 2nd Battalion, } Coldstream Guards.	Wellington Barracks.. ...	Lieut.-Col. Sir E. Hamilton.	60
" "	{ Members of the Ragged School } Mothers' Meeting... ..	{ Kingsland, Dalston, & } Shacklewell	Mothers' Meeting Association	50
" "	Brewers and Maltsters	Amersham, Bucks	Mr. Wm. Weller	35
" "	Mechanics, Labourers, and Families.	Shirly, near Birmingham ..	Rev. Nash Stephenson... ..	90
" 15	Shipwrights	Cardiff.	Messrs. Batchelers, brothers..	160
" "	Shipwrights	Cardiff.	Messrs. Chas. Hill and Son ..	140
" "	Masons, Paviours, and Labourers ...	Holborn District.	Parish Authorities.. ...	32
" "	Parishioners.	Itchen Stoke, Hants	Subscription	40
" "	Labourers	Northington	Lord Ashburton	60
" "	Pianoforte Makers	Regent-street	Messrs. J. and J. Hopkinson.	210
" "	Labourers	Brown, Candover	Lord Ashburton	160
" "	Shipwrights	Bristol.	Messrs. Chas. Hill and Son ..	38
" "	Agricultural Labourers	{ Badsey, Aldington, and } Wickhamford	{ Rev. T. H. Hunt, Rev. S. } Yorke, M.A., and John } Nind, Esq.	45
" "	11th Norfolk Volunteer Rifle Band..	Holkham	Capt. Holloway	12
" "	Labourers and Wives	Itchen Abbas	Rev. W. Spicer	33
" "	Mechanics and Farm Labourers ...	Northwick, Worcester ...	Lord Northwick	62
" "	19th Middlesex Volunteers	Battersea	G. F. Wilson, Esq., F.R.S... ..	19
" "	Brewers and Maltsters	Amersham, Bucks	William Weller	25
" "	Workmen	Fountain Works, Mitcham	M. W. Yates, Esq.	44
" 16	Rocking-horse Makers	Oakley-street, Westminster	Messrs. Palser and Mansfield.	25
" "	Estate Labourers	{ Moor-park, Rickmans- } worth	Lord Ebury	58
" "	{ Members of the Working Men's } Institute	North Audley-street.. ...	Subscription	24
" 17	Timber Merchants' Employés. ...	{ Nessington, Northamp- } tonshire	R. Reedman, Esq.	21

INTERNATIONAL EXHIBITION OF 1862.

The following regulations for the removal of British articles not liable to Customs' duties have been issued :—

1. The Exhibition will close on Saturday, the 1st November. Sculpture and light goods which can be carried by hand may be removed on Monday, the 3rd November. The general removal of the fine art and machinery sections will commence on Tuesday, the 4th November.

2. In order to give those exhibitors who may desire it an opportunity of disposing of their goods, and avoiding the expense of removal, the public will be admitted to portions of the industrial department of the building until the 15th November, during which time purchasers will be allowed to take away such articles as can be removed by hand.

3. No packing cases, except for the picture galleries or western annex, will be admitted into the building until after the 15th November; but articles not requiring packing cases may be removed, at the option of the exhibitor, on and after the 3rd November.

4. A permit to remove articles will be issued to every exhibitor. This will admit himself or his agent and the requisite number of workmen, for which he must make arrangements with the district superintendent. It will be absolutely necessary that the exhibitor or his agent attend in person to admit his workmen.

5. Every exhibitor, or his authorized agent, in taking out articles, must fill up a receipt, and deliver the same to the officer on duty at the exit door. Forms of receipt will be given by the district superintendent.

6. The whole work of re-packing and removing must be done by the exhibitor or his agent, who should, therefore, provide sufficient force to ensure the safe and speedy removal of his goods.

7. In order to facilitate the removal of exhibitors' goods, her Majesty's Commissioners have granted permission to the principal London railway companies to have receiving offices within the building.

8. All empty packing cases must be brought in at the door appointed specially for their reception, and should be marked with the exhibitor's name, and the class to which they belong. Packing cases left empty or unmarked for more than 48 hours will be liable to be taken out of the building.

9. Exhibitors are requested not to allow the materials for packing to remain spread about on the floors after they have ceased working for the day. Materials so left will be considered as waste, and be swept out of the building every morning.

10. Her Majesty's Commissioners think it right to remind exhibitors that all responsibility for losses, breakage, or damage of any kind, rests entirely with the exhibitors themselves. Every care will be taken to prevent errors and losses, but it must be clearly understood that no responsibility rests with her Majesty's Commissioners.

11. Any further information required may be obtained on application to Mr. R. A. Thompson, assistant manager, English side.

By order of her Majesty's Commissioners,
F. R. SANDFORD, General Manager.

1st October, 1862.

The regulations for the removal of goods on the foreign side are as follows :

1. The picture galleries and the machinery building (western annex) will not be opened after the 1st November.

2. Sculpture and light goods which can be removed by hand will be permitted to be carried out on Monday, the 3rd November.

3. Empty cases will be admitted on Tuesday, the 4th November; for the picture galleries, by central entrance,

Cromwell-road; for foreign machinery, by the northern entrance of the western annex.

4. In order to give those exhibitors who may desire it an opportunity of disposing of their goods, thereby avoiding the expense of removal, the public will be admitted to portions of the industrial department of the building until the 15th November, during which time purchasers will be allowed to take away such articles as can be removed by hand.

5. After the 15th November all the empty packing cases may be brought into the main building.

6. The following will be the exit doors for foreign goods :—

Western Door, Central Entrance, Cromwell-road—Italy, Rome, Spain, Portugal, Russia, Turkey, Brazil, Greece, Central and South American States.

Opening in Cromwell-road—France.

South-west Tower—Zollverein and Hanse Towns.

North Door, Western Dome—Belgium, Holland, Switzerland, Denmark, Sweden, and Norway.

North-west Tower—Austria.

South Eastern Tower—United States.

7. The above are to be considered as foreign goods.

8. Pass books will be delivered to each foreign Commissioner, who will be requested to give the signatures of two persons authorised to pass out goods.

9. Coloured passes only will be available at the foreign doors, duly signed by the authorised persons.

10. Goods can be taken out by hand at any door on the foreign side; but cases must be taken out by the doors indicated above as appropriated to each nation.

11. Her Majesty's Commissioners will afford limited assistance for the removal and loading of foreign goods remaining unsold, and packed to be returned to their respective countries.

12. This assistance will be given from the 15th November to the 23rd December, after which date the men will be discharged, and all the cranes, platforms, and appliances will be removed.

13. All personal or written demands for assistance to be made to Mr. Philip Cunliffe Owen, assistant manager, foreign side.

14. Her Majesty's Commissioners think it right to remind foreign commissioners that all responsibility for losses, breakage, or damage of any kind, whether in the building or during removal, rests entirely with the foreign commissioners themselves. Every care will be taken to prevent errors and losses, but it must be clearly understood that no responsibility rests with her Majesty's Commissioners.

15. In order to facilitate the removal of exhibitors' goods, her Majesty's Commissioners have granted permission to the principal London railway companies to have receiving offices within the building.

By Order of her Majesty's Commissioners,
F. R. SANDFORD, General Manager.

The Customs' Regulations for the Guidance of the Foreign Exhibitors at the Closing of the International Exhibition, 1862, are the following :—

1. All foreign articles liable to duty intended for sale by retail during the first fourteen days of November, must be previously cleared of the Customs, either by the actual payment of duty or deposit of money sufficient to cover all duties due.

2. In order to facilitate the speedy removal of goods, it will be necessary for the foreign exhibitors to furnish the officers of the Crown with a written statement (the form of which can be obtained at the Customs' office, No. 19, Western Dome) showing the nature and quantity of the goods, and whether they are intended for "payment of duty," or for exportation. This must be done on or before the 25th instant, on which day the amount of "duty

payable," or of the "deposit," must be determined and assessed.

3. No articles liable to duty shall be packed up either for "payment of duty" or for exportation, without the knowledge and consent of the officers of the Crown stationed in the building. If so done they will be unpacked in order that the necessary official return may be obtained.

4. In the case of dutiable goods for exportation, an entry shall be passed in the long room of the Custom-house, and bond given for their due exportation, and on the receipt of this entry by the officer in charge of the Exhibition building, the goods shall be packed in his presence, and if for shipment at an outport, placed under seal, and forwarded in charge to a railway or other public company; but if for shipment at the port of London, they shall then be sent in charge of Customs' officers at the expense of the exporter, to be delivered into the charge of the searcher of the station from which they are to be shipped, without further examination, under the regulations applicable to goods shipped direct from the warehouse.

5. The list of the principal articles subject to the customs duties is annexed:—

LIST OF PRINCIPAL ARTICLES SUBJECT TO CUSTOMS DUTIES.		s.	d.
Biscuits, bread, &c., per cwt.....	0	4½	
Confectionery, chocolate, per lb.	0	2	
Coffee, raw, per lb.....	0	3	
Coffee, roasted or ground, per lb.	0	4	
Chicory, raw, per cwt.	6	0	
Chicory, roasted or ground, per lb.	0	4	
Cocoa paste, per lb.	0	2	
Chloroform, per lb.....	3	0	
Cereals, grain of all sorts, per quarter of 8 bushels	1	0	
Flour, meal, rice, vermicelli, &c., per cwt.	0	4½	
Pepper of all sorts, per lb., and 5 per cent. thereon	0	6	
Plate of gold, per ounce, troy	17	0	
Plate of silver, per ounce, troy	1	6	
Raisins, currants, plums, and figs, dried, per cwt..	7	0	
Sugar, refined or candy, per cwt.....	18	4	
Sugar and molasses, according to quality, per cwt., from 16s. to.....	5	0	
Spirits, viz:			
Brandy, gin, and rum, per gallon	10	5	
Perfumed spirits, eau de Cologne, and liqueurs of all sorts, per gallon	14	0	
Tea, per lb.....	1	5	
Tobacco, viz:			
Cigars and manufactured tobacco, per lb., and 5 per cent. thereon	9	0	
Snuff, per lb., and 5 per cent.	6	0	
Unmanufactured leaf tobacco, per lb., and 5 per cent.....	3	0	
Varnish, containing spirit, per gallon	12	0	
Wines, in bottle, per gallon	2	6	

PRODUCTS OF INDIA.

The following notes are extracted from the official Catalogue of the contributions from India to the International Exhibition of 1862.

COTTON.

Only two specimens of this important article are submitted from Cuttack, as it must be admitted that, generally speaking, the cotton grown in this district and Pooree is wretchedly inferior, both in the length of its staple and in respect of cleanliness. The first sample of the raw material and the thread were presented to the committee of Cuttack by the Rev. George Taylor, of Piplee, a missionary in connection with the General Baptist Missionary Society, who has for some time persevered in an experiment on a small scale to grow, and thus encouraged others to grow, this useful staple. His plants reared from American New Orleans seed yield, as calculated on his data, at the rate of 300 lbs. per English acre, at an out-

lay of about 21s. per acre. On a light sandy soil the plants require manure and irrigation only in the hot months, or from March to June. There are specimens of good cotton grown in Sumbulpore, from which district a deal of cotton is annually brought down the Mahanuddy. The cotton is shown as first freed from its seed, and then as operated on by the *Dhooena* or cotton carder. His machine is in the shape of a bow, with a string of cat-gut, and his mode of operating is as follows: The bow is held in the left hand, and its string laid lightly on the cotton spread out on the floor. Then, with a short club in the right, smart strokes are administered to the string, which is thus made to vibrate, and so to take up and draw out the fibres, at the same time it may easily be seen breaking them. A man can thus card 10 lbs. of cotton per diem, and charges, according to season, from 2d. to 4d. and 5d. per pound, as the degree of fineness required is more or less. This method of carding cotton would, however, appear to be very ruinous. Very little care is bestowed on the cultivation of cotton in this province. In the settled parts the crop is for the most part a stunted, weakly, annual one, frequently grown in the same beds with other crops, and therefore yielding a poor return. More cotton is raised in the Sumbulpore district comparatively than elsewhere in the district, and three-fourths of the produce is said to be exported to Cuttack and Calcutta. Last season the local rates at Sumbulpore were, for uncleaned cotton, ½d. per lb., and for cleaned cotton, 3d. These rates may not, however, be assumed as average ones. The specimen cotton brought from Sumbulpore was, in October, 1861, selling at Cuttack by retail at 1½d. per lb.

It is difficult, in the absence of statistics, to state what may be the area in this division under cotton cultivation. From the last land settlement papers of the Cuttack district, dated in 1843, we learn that 3,000 acres were then sown with cotton in that district. There are no similar statistics available for the other parts of the division, but proceeding by comparison on this basis, and keeping well within probabilities, it may be said that, taking the entire division as at present constituted, there must be 20,000 acres annually cultivated for cotton. This, at the moderate calculation of 175 lbs. per acre, would give 3½ million lbs. of cotton as the entire crop of the division. Inquiries made a few years ago in Sumbulpore showed that in that district the cotton crop was 10,000 maunds, or 1 million lbs. But it is impossible to believe that the local produce is not very much in excess of the above estimate, namely, 3½ million lbs. It may be allowed, for instance, that the exports of raw cotton from the division, taken as a whole, are balanced by imports on the north and south boundary, and this perhaps is allowing a great deal. It may also be allowed that possibly 25 per cent. of the local cotton fabric is woven from mule twist or foreign thread, called the "Kal-Soot," or machine thread, which is undoubtedly used extensively, but only in certain well-known centres. After these deductions have been made, there are still 75 per cent. of the wants of the people of this division in the matter of clothing material to be accounted for. Now it is undoubted that these local wants in the gross are supplied to an insignificant extent only by Manchester piece goods, or any foreign-made cloth whatsoever, and it follows, if it were not otherwise a patent fact, that the mass of the people of the division are clothed with material of local manufacture. Supposing then that the gross population of this division, including, with the settled districts of Cuttack, Pooree, and Balasore, the Tributary Mehals, and Sumbulpore, be estimated at 3½ million souls, and assuming that on a safe average every individual annually requires 4 lbs. of cotton to clothe himself withal, there would be required for the 3½ millions of people, 14 million lbs. of cotton; and admitting that 25 per cent. of the local demand is met by the use of foreign thread, there will still remain 10½ millions lbs. of cotton, which, to all appearances, must be supplied from local sources. This

is close upon three times more than what, on the known area of cotton cultivation in one small portion of the division, has been calculated to be the total area of the whole.

Cotton is cultivated all over Oudh as a mixed crop, in light soils, with "Arhar," *Cajanus Indica*, or with "Kodo" *Papalum Scorbicalatum*, and often with maize. It is sown in the month of June. It is sown broadcast with the above, and nothing is done to it till it begins to ripen in the pods. The cotton is picked out of the shell which is left on the tree, but no care is taken to keep the clean portion separate, and to keep the best pods for seed. The proportion of staple produced is very small, on account of the bad treatment it undergoes, being, as it were, smothered by other fast growing plants. Almost all the wearing apparel of the ryots is made from native home-grown cotton. Its cost, with seed, is from 15 to 20 seers per rupee, and the fibre separated from the seed sells for 2 seers for the rupee. The seed is used for feeding cattle. No oil is extracted from it.

Cotton is principally grown by the hill tribes in Akyab, but little is brought down to Akyab or other markets. Price—from 6 to 7 rupees per maund.

The area under cotton cultivation in Pegu, in 1860-61, was 17,500 acres; estimated produce in cleaned cotton, 2,116,300 lbs. The general character of the native cotton is—fibre coarse, curly, harsh, and rather short, most tenaciously attached to the seed, but it is most exceedingly strong, and in this respect lies its excellence. Persevering efforts have been made to induce the Burmese to grow foreign cotton, but, as in the case of tobacco, without success. There are many millions of acres in Pegu now lying waste, where cotton can be grown of a quality far superior to any now known in the province, only awaiting European capital and superintendence. It is hoped that the recent offer by the Government of India of the fee-simple in waste lands, free of tax for ever, at the low rates of 5s. and 10s. an acre, will attract both speedily, to the mutual benefit of England and Pegu.

Specimens grown from American seed at Lahore are shown. The average for cleaned cotton is 3d. per lb., and for uncleaned 1d. per lb.

Cotton is grown largely in the Punjab, chiefly for home consumption, but the soil is generally not so suited for it as the basaltic soils of Central India. Still there is no doubt, from experiments which have been made, that the Punjab is capable of producing cotton suitable for the English market. But efforts to secure it must not be confined to making speeches at Manchester; the only practical plan is to depute persons of skill and capital to direct the people in the best mode of preparing the cotton, and to buy up the produce on the spot. Specimens of cotton from the principal cotton-growing districts of the Punjab have been included in the collection, and also a specimen of cotton grown from American seed in the Dehra Ismael Khan district. The localities best suited for the growth of cotton are the submontane districts of Umballah, Hoshiarpore, Gujerat, and Peshawur, but with irrigation it might be produced almost anywhere. From official returns published in the *Punjab Gazette* of the 28th August, 1861, it would appear that altogether about 467,513 acres are under cotton cultivation in the Punjab and its dependencies. The average produce per acre of cleaned cotton varies from 50 to 150 lbs.; its price varies from 2d. to 4½d. per lb.; and the whole cotton produced per annum amounted to 20,000 tons, of which not more than 3,500 tons were exported. The time of sowing varies from February in the south, to the middle of June in some of the northern districts. The flowering commences, according to locality, between August and December; the picking follows about a month after the flowering, and continues at intervals for two months.

Cotton is one of the chief products of the Banda district. Inquiries have lately been made for the purpose of ascertaining the present extent of cotton cultivation, From these inquiries it appears that in the present year

the total number of acres in the district cultivated with cotton is 89,022. The area of the district in acres is 1,920,302. At this rate, therefore, about 4½ per cent. of the whole area of the district is cultivated with cotton. The extent of cultivated land in the district is 955,522 acres. Cotton cultivation occupies rather more than 9 per cent. of the whole cultivated land. This per-centage varies in different parts of the district. The Eastern Pergunnahs produce both absolutely more cotton than the Western Pergunnahs, and more relatively to their size. In Tirohan cotton occupies nearly 22 per cent. of all the cultivated land of the Pergunnah. The best cotton comes from the Beergurh and allinger portions of the Budonsa Pergunnah.

Cotton is a precarious crop. Its success or failure depends entirely upon the rain-fall. It is injured by drought, but its chief risk is from excess of rain. Last year considerable damage was done to the cotton crops by the severity of the wet season, and especially by the heavy fall of September. Cotton being entirely a "Khureef" or rain crop in this district (Banda) it cannot be sown in the low rich lands which bear the best spring crops, and which are generally flooded in the wet season. It is sown generally on high ground, on higher soil, in the sides of ravines for instance, or on elevated spots where the water cannot lodge. In its best season it is more remunerative than ordinary crops, but it is uncertain and precarious, and in the long run it is not sufficiently remunerative to induce ryots to cultivate more than a small portion of their land with it. If a man has 10 or 15 beegahs of land, he will almost certainly cultivate two or three with cotton, but he will not cultivate more. If the price were to rise the cultivation would no doubt be extended; and if it rose enough to make the cultivation of cotton considerably more profitable than that of other crops, it might be extended almost indefinitely.

In this district the same land is never cultivated with cotton in two consecutive years. After a field has borne cotton, always two years and sometimes three are allowed to intervene before it is again sown with that crop. Entirely new lands are said to be more fruitful than any; fresh cotton is always sown. The same plants are never allowed to remain standing for a second crop. It is the common opinion of the people of the district that the plants produce nothing in the second year. The sowing takes place in the month of Asar, or July, commonly after the first fall of rain. The ground is generally manured, if the ryot can afford it. It is ploughed only once. It is never watered, but it is always weeded while the crop is springing up. It is weeded, as a general rule, three times, but in some cases it is weeded four times, and occasionally, but very rarely, as many as five or six times. The weeding takes place during "Sawun" or August, "Bhadow" or September, and the beginning of "Roar" or October. About the end of October the crop is generally matured, and the gathering takes place between this and the end of December.

It is not easy to estimate the produce per acre. The produce varies considerably in amount in different parts of the district, and the want of a fixed standard of weight throws increased difficulties in the way of forming any satisfactory estimate. In no two pergunnahs is the "seer" exactly equivalent, and in many cases the variation in the standard is very large. Another difficulty arises from the fact, that in this district cotton is scarcely ever sown singly. Urhur, Oorid, and Teelee (an oil plant) are almost invariably sown with it in small quantities. No doubt, if cotton were cultivated alone, the average produce would be higher than it is. As it is, taking the seer of the full weight, probably the average produce per acre in ordinary years does not exceed 80 seers of "kupas," kupas being the raw uncleaned cotton with the seed. The price of kupas in the villages varies from 9 to 14 seers for the rupee. But this difference is due probably more to the variation in the standard of weight than to any other cause. Probably from 10 to 11 full weight seers

for the rupee may be taken as the average price of kupas over the whole district. This would give nearly 8 rupees as the average value of the produce of an acre, and rather more than 3 rupees as the value of the produce of a beegah. This estimate must be near the mark, because from 3 to 4 rupees is the sum at which the people of the district themselves almost invariably estimate the value of the produce of a beegah of cotton. And something must be allowed for the produce of the urhur, teelce, &c., sown with the cotton. The estimate cannot be too high, because if it were, cotton would be less remunerative than other crops, which it certainly is not. The kupas or raw cotton is prepared for the market by the extraction of the seeds. This is done with the instrument called the "*Churkhee*," consisting of two small rollers, one of iron and one of wood, which are made to revolve in opposite directions, and in close proximity one above the other, their axes remaining parallel. The raw cotton is introduced between these rollers, and as they revolve the pure cotton is carried through while the seed is separated and left behind. The instrument in use in this district is worked by two persons, each turning a roller, and is the same as that to be found all over India. The raw cotton loses from two-thirds to three-fourths of its weight under the *churkhee*. That is to say, of the better kinds of cotton one seer will be obtained from three seers of "kupas," the remaining two seers being "benowur" or seed. In the inferior qualities, it requires four seers of kupas to produce one of cotton. It follows, then, that if the average produce of an acre sown with cotton be assumed to be 80 seers of kupas, the average produce per acre of "rooe" or clean cotton will be between one-third and one-fourth of that quantity. Probably 25 seers per acre will be a fair estimate. But this estimate, it should be remembered, is for ordinary years. The last must be considered an exceptional year, the cotton crop in some parts of the district having almost entirely failed in consequence of the heavy rain fall in September, and being generally more or less damaged. The actual average produce per acre for the year will probably be considerably below the above estimate.

As a general rule, the kupas is cleaned of seed and prepared for the market by the ryots themselves. But not unfrequently traders, "*baipareas*," buy up the raw material in large quantities, and pay for its cleaning by hired workmen. In this case the workmen are paid in proportion to the amount of clean cotton produced. The rate varies from year to year, and differs in different parts of the district. For producing a maund of clean cotton the rate is sometimes as low as 6 or 8 annas, and sometimes as high as one rupee. Eight annas may perhaps be taken as an ordinary rate. The cotton seed or benowur obtained by passing the "kupas" through the *churkhee* may be valued at about one rupee per maund. The data for calculating the cost price of a maund of clean cotton of the best quality are as follows:—

Cost of 120 seers of kupas, at 10 seers per rupee	12	0	0
Cost of cleaning by <i>churkhee</i>	0	8	0
Total rupees	12	8	0
Deduct price of maunds of "benowur" (seed), at 1 rupee per maund	2	0	0
Rupees	10	8	0

Rupees 10-8 may thus be regarded as the cost price of a maund of clean cotton. Allowing for the trader's profits and for cost of carriage, we have from rupees 12-8 to 13 rupees as a fair market price under ordinary circumstances. This happens to be exactly the price of cotton at the present moment in the market of the district. The price may be expected to rise. The price always does rise towards December and January (it rose last year to 16

rupees per maund), and this year (1861) the shortness of the crop will, no doubt, make itself felt, while the Manchester demand will also probably not be without its effect. Taking the average produce per acre of cleaned cotton at 25 seers, and 13 rupees as the price per maund, the following estimate of the out-turn of the district in maunds, and its value is obtained:—

Area Cultivated with Cotton. Acres.	Estimated out-turn in Maunds.	Estimated value Rupees.
89,022	55,639	7,23,307

This represents the out-turn and its value in ordinary years. Probably in the present year (1861) the out-turn will not be much above 50,000 maunds. At 13 rupees per maund, the value of this quantity would be 650,000 rupees. But the price will probably rise so as to make the value considerably higher than this.

Of this total out-turn probably about seven-eighths is exported, and the rest remains in the district, and is used for the manufacture of cloth and other purposes. That which thus remains passes through the hands of the "*behnas*," who card it and twist it into thread with the instrument known as the *dhunooee*, and prepare it for the weaver. Almost all the cotton which is exported passes either through Chilla, on the banks of the Jumna, in Purgunnah Pylanee, or through Rajapore on the Jumna, in Purgunnah Cheebow, and far the larger portion through the latter place. At these places the cotton is shipped in river boats, and carried thence to Mirzapore, Ghazepore, Calcutta, or elsewhere. The average cost of transport is 1 rupee per cart to Chilla, and 4 rupees per cart to Rajapore. A cart carries from 9 to 12 maunds. The water carriage by boat from Chilli to Mirzapore is 3½ annas per maund, and from Rajapore to Mirzapore from 2 to 2½ annas per maund. The present price of cotton in Rajapore is 12 rupees a maund.

The following statement shows the extent of cotton cultivation in different pergunnahs in Zilla Banda:—

NAME OF PERGUNNAH.	Total area in Acres.	Total Cultivated Area in acres.	Cotton Cultivation in Acres.	Per centage of cotton cultivated in relation to the whole area.	Per Centage of cotton cultivated area.
Banda	2,42,983	1,44,303	8,759	3·6	6·07
Pylanee	2,47,884	1,46,083	9,730	3·9	6·6
Ongasee	2,32,449	1,35,468	8,298	3·5	6·1
Seonda	1,83,483	1,08,712	5,684	3·1	5·2
Dursenda	2,30,832	1,24,260	14,779	6·4	12 nearly.
Chiboo	2,02,318	97,011	9,947	4·9	10·2
Tirohan	3,41,027	78,878	17,297		22 nearly.
Badousa	2,38,936	1,20,837	14,528		12·0
Total	19,20,312	9,55,552	89,022	4·6	9·3

BRITISH ASSOCIATION, CAMBRIDGE, 1862.

PREVENTION OF RAILWAY ACCIDENTS.

The following paper, by Mr. J. Sewell, Assoc. Inst. C.E., was read in section G:—

This is a subject of great importance, both to the travelling community and the railway interest, yet, in my opinion, it is one that admits of a solution with benefit to both parties.

Through your goodness, some years ago I was enabled to bring under the notice of the Association a paper upon the causes of boiler explosions, fracture of axles, the advantages of thick edge boiler-plates, &c., which I believe has been useful, and I trust that my present suggestion, of a simple yet effective plan to obviate most of the railway accidents that occur, will likewise prove of utility.

The primary cause of most of the serious railway accidents is, that railway companies are not liable either for over-loading their engines or for not keeping time at all the stations. It only requires, in my opinion, to attach suitable penalties for both over-loading engines and for not keeping time, to ensure greater safety to the public, and better dividends to the shareholders. On many lines trains are more numerous than there is any need for, since every district has a regular traffic; beyond which, it requires stimulants to temporarily increase it, which stimulants, judiciously employed, do good, but, when used in excess, are both costly and dangerous, as train after train follow each other, some stopping at one station, and some at another station, and some, as express trains, at very few stations, where one train would suffice. A few accidents arise from gross neglect of signal duty, defects of the road, and breaking down of plant, which are more or less strictly accidental, for the best mechanism may, and does fail. The human being likewise may, and does fail unexpectedly at times, especially during long sustained watchfulness, whether on railways or other duty. On railways both men and mechanism frequently fail through overwork, or through surprise, caused by irregularity of the trains, as, for instance, the Brighton Tunnel and Kentish-town catastrophes, as well as many others.

Railway companies issue time bills for the guidance of their servants and of the public, but plead non-liability to keep such time. The plea is passively allowed, for there is no one to enforce time being kept; so that few trains keep time exactly at all the stations they pass, yet no effective notice is taken of this breach of contract unless through an accident. Now, as the loss of time is mainly due to irregularity in starting trains, and to over-loaded locomotives being unable to keep the specified time, it is evident that punctuality in starting trains, proper loads, and well kept time at all stations would effect a most advantageous improvement upon the present state of these matters.

It is commonly supposed that the steam horse possesses such unlimited power that a carriage or two more or less makes little or no difference to running the given distance in the given time, but this is a popular error which lies at the root of all the mischief.

The power of the steam horse is proportionably as easily overlooked, as is that of the coach or race horse, with this difference against the steam-horse—namely, that he has to contend against all the contingencies of slippery rails, inclines, retarding winds, delays at stations (often due to travellers themselves), yet is popularly expected to run the distance in the given time, whether heavily or lightly loaded, whether stormy, slippery, or calm.

Now when the race-horse runs against time, the weight is fixed for distance, time, and other circumstances. No one would dream of over-weighting a race-horse, and then running him against the time for the lightest racing weight, yet this is the practice of railways, whereby irregularity is the result. Nature limits the power of the race-horse, and, in order to save fuel, mechanism is used to limit the power of the steam-horse, hence delays take place and risks are incurred in order to save a little fuel. This mechanism, as is well known, cuts off the steam from the cylinder some time before the power has reached the end of the stroke, varying from one-fourth to three-fourths of the length of the cylinder, so that the *real* and the *nominal* power may, and do differ widely. If, therefore, an engine, having its power thus limited to take eight or ten carriages in the given time, has to take ten or twelve carriages, it follows that such over-loading will cause loss of time.

But, as travellers do not know the power of a locomotive by looking at it, nor clearly understand the dangers they run on a crowded line by its being over-loaded, it becomes, I think, the duty of the Government to step in and ask for power to licence each locomotive for a certain duty, and to enforce regularity of time at all stations, as essential to public safety.

It has been found necessary to licence steam-boats and common road vehicles to carry a given number of passengers only, and, in like manner, it has now become requisite, for public safety, to licence each locomotive to draw a definite number of vehicles, whether for passengers or for merchandise, and to place that licence conspicuously on each engine. Passengers generally take care that carriages are not over-crowded, and would equally take care that locomotives were not over-loaded if they only knew the right load by referring to a licence plate on each engine. If it is necessary, for pecuniary reasons alone, that arrangements between two companies, or between the Post-office, and companies should limit the loads as they do, it is undoubtedly necessary, on the ground of safety between the railways and the public, to limit the loads to the real power of the engines.

The Board of Trade could easily carry out the required duty by means of qualified inspectors, with power to periodically alter, renew, or withdraw licences, as the working state of each steam-horse might warrant from time to time.

As such a step would probably require either an increase of locomotive power or a decrease of speed to work the same traffic, it would prove to that extent that the present engine-power was deficient for safe working. It is the over-loading of engines and uncertainty of time that renders excursion trains more dangerous than others, but that is no valid reason why excursion trains should be discontinued. In fact, there is no more need to deprive excursionists of their healthy cheering trips, which contribute to recruit both their mental and bodily vigour and railway exchequers, than there is to deprive society of food or wine, because both are occasionally abused.

Since excursion trains are a mine of wealth to a railway company, and a mine of health to the community, instead, therefore, of prohibiting them, as is too often suggested, they should be extended, as they may be without any such risks to them or to other trains as they have hitherto had to encounter. Substitute well kept time, for the present ill kept time—licensed engines for unlicensed ones, and trains may be run more frequently, and more safely than at present.

Under the present non-liability system, it speaks highly for the general vigilance of railway officials that so few accidents occur, and such an alteration as the one now proposed would be a great relief to them. The traffic on several railways now resembles that on an overcrowded street, where great difference in speeds cannot be allowed with safety; and as in crowded streets the extreme speed of the horse is dangerous, and at a moderate speed an enormous traffic can be carried on safely (along London-bridge, for instance, where there is five times the traffic of any railway), so in like manner on railways extreme speeds should be reduced to moderate ones; regularity be substituted for irregularity, whereby both safety and economy will result.

It is an axiom, I may say, that extreme speeds entail extreme costs, besides risks, for on railways as on roads or streets, costs increase in a greater ratio than velocities, so that high speeds and higher costs are synonymous and convertible terms. Limited loads and kept time duly enforced, appear to me to be simple remedies for the existing dangers, which would alike contribute to the public safety and increased profits to railways.

OBULATE PROJECTILES WITH CYCLOIDAL ROTATION, CONTRASTED WITH CYLINDRO-OGIVAL PROJECTILES, HAVING HELICAL OR RIFLE ROTATION.

The following paper, by R.W. Woolcombe, was read in Sect. G:—

Although a paper entitled "An Account of some Experiments with Eccentric Oblate Bodies and Discs as Projectiles," was produced by me in March last, before the Royal Society, and was printed in their proceedings for May, yet the results of some further experiments with a

model at Shoeburyness, as to penetration and velocity, appear to me of sufficient interest in a practical point of view to be brought to the notice of the British Association.

It appears that in gunnery the requirement of the day is some arrangement by which, in one shape or other, heavy solid shot can be projected with high initial velocity, yet such velocity be maintained better than it can be in spheres.

While ships were of wood there was a requirement for powerful and capacious shells, and such projectiles were forthcoming by the rifle principle, but (abiding the results of the progressing trials with Mr. Whitworth's punch-headed shells), the iron plates may be said to have brought solid shot into the foreground. Rifled cannon, it appears, cannot project heavy elongated shot with high velocity, and it is seen (again excepting Mr. Whitworth's results with flat-headed projectiles), that, for the penetration of iron plates a high velocity is essential, at least within the more manageable weights, say up to 120 lbs. It seems that for heavy shot we have of late reverted to spheres, and thus, after an acquaintanceship of not many years' duration, have so far taken our leave of science for the solid projectile, retaining her aid only for the building up of Cyclopean smooth-bore cylinders. A return to the smooth-bore cylinder would not necessarily be a retrogression, it might be an advance in science could we successfully project from the smooth-bore shot that are elongated; it is in the abandonment of elongation for the projectile that science has retrogressed. If, then (with the exception still under trial), we find that from neither rifled nor smooth-bored cylinders we can advantageously project, in respect of iron plates, heavy elongated shot, are we compelled by the requirements of the hour, therefore, to forego for the larger calibres the many advantages we have learned from the smaller calibres to appreciate in elongation? The question presents itself: "What is there in the rifle principle and in elongation by the cylindro-ogival form that appears to bar development—that prevents a natural expansion from small to great calibres—that in* practice makes the 80-pounder give scarcely more range than the 3-pounder, and but just now, when called upon for great action, has made this principle give place to the primitive sphere and smooth-bored cylinder? Mr. Whitworth's 3-pounder at 5° elevation gave 2,500 yards; his 80-pounder at 5° gave 2,544, each with a charge of about $\frac{1}{4}$ th the weight of projectile. The reason may, I believe, be found in the artificial basis of the rifle principle. However well-suited the helical or rifle method, with cylindrical elongation for the projectile, may be for small arms, and for, perhaps, the lesser calibres of cannon, yet when we desire to so far imitate nature as to project with great and sustained velocities, great weights, we might succeed better were our mechanical arrangements less antagonistic than are those of the rifle principle to certain great laws of nature, to the laws which have ruled in the form, method of rotation, and translation of what I may here term the great natural projectiles—the planets. Do we find any one of these to be a prolate body projected with helical rotation about its longest diameter and in the direction of such axis? In the two first conditions, namely, the prolate form and helical rotation, we have, I think, the clue to the small initial velocity afforded by, and inexpansive nature of, the rifle principle; and in the third condition, or the axis of rotation lying in the plane of projection, is the reason why the rifle principle has not done, and never can do, anything to improve vertical fire, or to be in any calibre effective dynamically except at very low elevations, a matter of no consequence in small arms. These defects are inherent to the rifle principle. Is there any other arrangement practicable in which, by a construction less in violation of the natural laws alluded to, the defects spoken of in respect of rifled cannon may not exist? In reply, I have to say that I have found it to be practi-

cable to project a body that is, instead of being prolate, more or less oblate; that, instead of having helical rotation at the expense of translation, has cycloidal rotation in aid of translation; a projectile that rotates about its shortest diameter, or the natural axis of rotation of a body naturally formed for rotation, instead of about the longest diameter or unnatural axis of a body not formed for rotation; that while the projectile has a circular periphery in the line of motion in the gun, and can thus leave the bore as freely as a common round shot, yet it has the additional security for high initial velocity of windage much* smaller than could be allowed for round shot of similar weight; that is, like the round shot, driven through the gun along a straight smooth bore, but as a wheel, instead of being forced into and through a helix as a screw, and thus conditions for a vast superiority in initial velocity are given to it over the rifle projectile, and from the diminished windage much superiority in initial velocity over the sphere. The terminal velocity is also provided for by the oblateness, and for any elevation† by the axis of rotation being transverse to, and not in the plane of the trajectory.

The gun is of similar transverse section to that of the projectile, the bore, as has been said, being straight and smooth, with the longer axis of the bore in a direction perpendicular to the common axis of the trunnions. The gun is to be fired with the trunnions as horizontal as possible, as indeed all guns are. The projectile is a disc, scarcely more costly in manufacture than a common round shot, and which is fit for use almost in the state in which it is taken from the mould. It must be slightly eccentric or it will not rotate. I find that not more than $\frac{1}{100}$ of the concentric weight need be added or subtracted to secure rotation; less than $\frac{1}{100}$ has given rotation in a disc. All spherical shells used by the American Federal states are purposely made eccentric by about a similar amount. All spherical shells are *inevitably* eccentric, so are ninety-nine out of a hundred spherical shot. I merely propose to apply to an advantageous purpose an eccentricity scarcely greater than is *inevitable* in any spherical projectile, and by such means to secure and multiply the advantages of virtual elongation by the cycloidal rotation of an oblate body instead of the helical rotation of a projectile elongated cylindrically, by which is to be, I believe, secured an initial velocity greater than that of a sphere in a ratio increasing with dimensions, and the conditions are afforded for maintaining such velocity at any elevation better than can be secured by the use of the rifle principle.

I will mention, as briefly as possible, the results of experiments shown to the Ordnance Select Committee in March last, with a small rough model. The gun was only 20½ inches long in the bore, or 10½ calibres in length, the calibre (long diameter), being about 1½ inch, and the transverse or short diameter about $\frac{3}{4}$ inch. The shot weighed between 7½ and 8 ounces. The experimental gun being externally a mere cylindrical block, weighed more than would have been otherwise necessary, and from

* For a round shot must be allowed a larger margin of windage for defects in sphericity than is necessary for a disc; the latter need only slide freely laterally, and can roll but on one axis, the round shot must have windage enough to roll on an infinity of axes. A remarkable instance of the effect of windage on velocity is seen by the results of some recent experiments by the Ordnance Select Committee with Navéz Electro Ballistic Apparatus. Of all the kinds of solid shot guns (smooth bored), from the 68-pounder of 95 cwt., to the 6-pounder, the highest initial velocity, with the full service charge, was given by the 12-pounder (smooth bore); doubtless from the fact of that being the largest of those smaller calibres to which the windage of only 0.1 inch has been allotted—so that the windage of the 12-pounder is comparatively the least of any of the smooth-bore guns. All the guns, except the 68-pounder, were fired with a charge of one-third the weight of the shot; the 68-pounder with the usual charge of 16 lbs., or about one-fourth.

† As the requirement of the tangent to the path does not obtain in discs.

* Vide *Times* of February 20th, 1860, for report of the Southport experiments.

having also been of necessity built up and not bored, its weight was about 130lbs. With a charge of $2\frac{1}{2}$ oz. the penetration at 25 yards from an oak target was a mean of 11 inches reckoning to the near side of the disc, and to the far side nearly 13 inches. The initial velocity which gave this penetration was, as measured by Navéz Electro Ballistic Apparatus, 1487 feet per second. Desirous of comparing a spherical shot with mine, the Ordnance Select Committee fired a few shots with a small brass gun, the length of bore of which was 34·625 inches, and nearly double the length of mine in calibres. The mean calibre of the Committee's gun was 1·60 inch, but at the muzzle something more. The mean diameter of their shot was 1·43 inch. Fired with proportionate charges the penetration of the disc gun was more than double that of the Committee's gun in the oak, and its initial velocity as 1487 to that of the Committee, 1091. The mean penetration of the Committee's gun was 5 inches, that of mine 11 inches. In these trials at the oak, all the discs fired with the centre of gravity "above" in the bore struck upright as fired.

At a subsequent trial for velocity some discs were fired which were laterally as well as longitudinally eccentric, and though they evidenced by the holes in the target confirmed rotation on the desired axis, yet this rotation was not in one plane. At close quarters this would be immaterial, as the penetration is not affected, and I believe it to be very practicable to make discs sufficiently symmetrical and homogeneous laterally.

Excepting when the trajectory was square or perpendicular to the plane of the target, a condition that must be I presume very rare in actual service, a disc would have almost the advantage that a flat-headed cylindrical projectile has in respect of contact over one with a hemispherical or ogival head, while for the reasons I have already named the disc is likely to have a much greater velocity than any rifle projectile, in which case more effect is probable against iron plates.

I will conclude by mentioning that even with this short model of 20 inches long, or $10\frac{3}{4}$ calibres, the velocity has approximated to that from the 68-pounder of 95 cwt, viz.:—1494·4 feet per second, as compared with 1553·3 feet per second, the former at 60 feet from muzzle, the latter at 90 feet, the former with $\frac{1}{2}$ of discs weight, or 2·625 ounces, the latter with 16lbs. charge or about $\frac{1}{4}$ shot weight.

I think then, that having in view the great requirement of the day, in respect of projectiles, viz.:—the conditions for effecting the penetration of iron plates—it may, considering the above results, already appear worthy of regret that the subject has been permitted by the military authorities to fall to the ground without any further trial.

ON THE SUBJECT MATTERS AND METHODS OF COMPETITIVE EXAMINATIONS FOR THE PUBLIC SERVICE.

The following paper was read in section F, by the President, Mr. Edwin Chadwick, C.B.:—

I may assume that the principle of competitive examinations on an open and a fair field, without favour, for junior appointments to the public service, which has been discussed at two meetings of this section—first at Dublin and next at Leeds—which has been several times affirmed in parliament, will be maintained and advanced on further trial. Nevertheless there is much in the subject matter of the examinations, and in the methods of conducting them, which in the view of many who have paid attention to the subject require amendment for the sake of the principle itself. I am desirous, therefore, of raising a discussion in relation to those subject matters and methods, to obtain the results of as much as possible of the experience of members of the university who have been engaged in the important service of testing qualifications by means of open competitive examination. In respect to the subject matters of examination for the most important competitions, I conceive that the civil service commissioners and the members of the council of military

education could not, at the outset of the system, well do otherwise than adopt, as their subject matters of examination, the generally accepted course of a liberal education as nearly as was practicable. But it is one important effect of the principle of open competition, and of the practical arrangements in connection with it, that it must bring scholastic systems and principles of education and subject matters more closely than heretofore into harmony with the practical requirements of the country.

I may go further and say that, instead of adopting any of the accustomed academic courses, the experience of the public requirements of the service must fashion those courses to the service required. It may, however, be submitted to be for the advantage of academic institutions that it should do so. The requirements for the leading competitions—those for the scientific corps of the army and the Indian civil service have led to the extension and formation of large preparatory schools, for giving training for those public examinations, which, for myself, I should have preferred to have given by our own chief public schools. The head of one large public school advised a friend who had a son to prepare for a competitive examination, to take him to one of the special preparatory schools in preference, as being superior in efficiency for the special purpose. I believe that those schools are of considerable and increasing comparative efficiency, for this reason, that they are themselves, by the competitive principle, put under the most direct and powerful competition with each other. Not only do the schools compete, but each master of each head of competition with the teachers of that same head of competition in all the other preparatory schools. I have made inquiries of the head masters of several of these successful training schools, and I may express a confident opinion that they would all agree in the importance of ridding the competitions to the uttermost of everything necessitating or favouring cram. They would next agree that the present topics of competition are too numerous. It is true that the competitor may take up a lesser number of heads than are put forth, but practically to permit, say five heads of competition, at the same time, amounts to prescribing five. Mr. Canon Mosely, in one of his reports, adduces evidence of the general fact that as you spread the requirements wide so you get shallower or lower results on the average in each head of competition included.

The experienced heads of preparatory schools would, I believe, further agree that it is much better for teaching, and necessary for the avoidance of cram, as I should maintain that it is better for the public or for private service that the requirements should be narrow but deep, rather than wide and shallow. We are not, however, considering the extent of the requirements, but what shall be the subjects of competition, for you may include as many as you please of accomplishments for paper qualifying examinations, whilst you exclude them from competition. We exclude existing acquirements to be imparted for the future. If a man has this or the other attainment, forming part of a liberal course of education, it is said to be bad to deprive him of the benefit of its estimation. We are, however, considering not what he has but what he ought to have, not what may render him an accomplished member of elegant society, but what will make him a good public servant, or in private service enable him to yield a full equivalent for the pay he receives and to sustain responsibility in leading positions. We shall come to a sounder decision on these questions if considering of professional service for ourselves we consider of the qualities which we may need, and for which we are prepared to pay in case of need. These will be the qualities most required for the service of the state.

Considering how we may best narrow the heads of competition, I would propose to omit history. A man ought to know the history of his own country, it is said. Yes, but not make a range of the events and characters of

some thousand years of the past, and too much of the bad, the subject of competition, at the expense of proficiency in one or other of the sciences, the purer and the better. Moreover, history as a topic is one great field of cram, of reliance on memory, and of developing.

The next heads which I submit for discussion are the literatures of different countries. Ought not a gentleman to be versed in polite literature, it is said? Certainly; but it is not needful that it should be the subject of competition, at the expense of proficiency in other and indisputably better and more needed subject matters of training. Literature is moreover another great field of cram and dodging examinations, giving opportunities of trick, yielding chances to the idle who have read for amusement over the diligent who have laboured for the serious business of life. The literatures may be left for cultivation to social influences, and to their own attractions and advantages as recreations. As tests, moreover, they are of an inferior order. These two heads being dismissed as subjects of competition, we come to those which are admitted as means of mental training and superior tests of aptitude. First in appointed order are the mathematics. It is submitted that taking them as a main test, whilst the basis of examination is made narrower, it should be made deeper or rather longer, and that double the time should be given to it. This would have the advantage of giving the slow but sure a fairer chance against the quick, and may be the superficial, and would render the examinations less painful to the nervous.

One opinion I find increasing in strength is that greater prominence should be given to the experimental sciences, and that, indeed, for the scientific corps of the army they should be made the chief topic for competition, and of course for preparatory education. The grounds of this opinion are that mental exercises in the supplemental sciences include exercises of the faculties in induction as well as in deduction; that eminence in the pure mathematics has not been in this country or in France accompanied by equal eminence in the public service; that the experimental scientist is non-practical; that if it were put to a chief of engineers, or to a mechanical or eminent civil engineer in this country, which of two competitors he would choose as an assistant, the one who was eminent in mathematics, or the one who was eminent in the experimental sciences, the latter would from experience be the one chosen. I confess that I give a strong preference to the experimental sciences, from what I know of the failures of the French engineers, who are pre-eminent in pure mathematics, and from what I know of the failures of pure mathematicians at home, of which I could give, and have, indeed, elsewhere given examples. As a mental exercise, I must say that I think that exercises in logic might well take the place of much of mathematics, and for this reason—that I find skill in clear logical examination and exposition, and arrangement of business, to be rare qualifications amongst candidates for the public service. But it is impossible to look at French administrative and legislative documents, or at French scientific treatises, without being struck with their logical arrangement and clearness of exposition; and we find in almost every curriculum of a French course of superior education logic placed in a foremost rank, and we see its influence. In olden time, when logic was more cultivated in the English universities, we may trace its influence, in legal and clerical expositions, in greater clearness of arrangement and force of exposition than we now find prevalent.

Keeping in view the general proposition that it is requisite to reduce the topics for competition, there is now presented for consideration which language, dead or living, shall be the subject of pass or merely qualifying examinations, and which the subject of competition as a test of qualifications for the public service. As an officer who has in his time had much to do with the selection of gentlemen, men of liberal education, for first-class officers, and with their subsequent direction, I answer at once the vernacular, for the following reasons:—First, the small

proportion who are found to write the mother tongue well and clearly. Out of several hundred gentlemen, sons of persons of wealth, who were examined for direct commissions in the army, the majority were plucked for bad English, for bad spelling, in fact for want of a common knowledge of the mother tongue. The bad English of the dispatches of generals and superior officers in the Crimean war was notorious. Kings' and Queens' speeches are presentable as examples of bad English. It may be pleaded that all these were not children of the university. But it was a subject of observation that the translation of the university statutes into English sent to the university commissioners, translations by men of high classical attainments, was into English which would not have been creditable to the scholars of a poor grammar school. Mr. D'Orsey, a member of the university, has advocated the urgent necessity of the study of English. In respect to the selection of a language as a mental exercise, the great European philologist, Grim, prefers German to either Greek or Latin, and prefers the English to the German. Dr. Latham and other philologists do the same. On such impartial and competent authority I would rely, making no pretensions to any of my own. Reserving the dead and foreign languages for pass or qualifying examinations, we should reduce the heads of competition from five, including two histories of peoples, and two literatures of peoples, to the vernacular, to mathematics and to the experimental sciences, which I think would be approved by the present state of opinion on the part of those conversant with the subject, including some experienced heads of preparatory schools. By this arrangement cram would be well nigh abolished. The Duke of Cambridge and the Council of Military Education have made important advances in the direction which I advocate. They have separated the literatures from the languages, so as to enable competitors to compete in the languages alone. The results of these advantages have, I believe, been such as to justify and require further advances to be made in the same direction."

AUSTRALIAN EXPLORATION.

The *Times* correspondent from Australia writes:—Two new rivers have been discovered in Queensland, and, still more important, Mr. Landsborough, the bold and dashing Queensland explorer, arrived in Melbourne about a fortnight back, having completed his expedition clean across the continent (something to the east of Burke's route) from the Gulf of Carpentaria. It was an interesting coincidence that Mr. Landsborough himself was present at the meeting of the Exploration Committee of our Royal Society on the occasion of the presentation by Sir Henry Barkly to John King (the survivor of Burke and Wills's expedition) of the gold watch forwarded to him by the Duke of Newcastle on behalf of the Geographical Society. There was a great gathering on the occasion, including many ladies. Finally and satisfactorily it is now established that the vast interior of this land is *not* a great sandy desert. Mr. Landsborough informs us that on starting he followed up a stream for 150 miles through a fine country, south-westerly, intending, if possible, to reach Stuart's route, but that owing to the time lost through the wreck of the Firefly (attendant on the earlier part of the expedition) he was unable to effect this object. He states that he reached the source of this stream; that it commenced with a fine spring, three feet deep, very rapid, and sufficiently strong to turn a wheel. Returning down this stream, he found that at about 80 miles from the Gulf it threw off two streams, the one flowing into the Nicholson river, the other into the Albert river. He then proceeded for the Flinders, having failed to discover the tracks of Burke's party, and followed up that river for 400 miles through what he describes as "magnificent country." At this point the party left the Flinders (which Mr. Landsborough thinks is about 500 miles long), and in about 20 miles reached the watershed of the Thompson

one of the main heads of the Cooper river. Proceeding thence about a hundred miles, he came upon a tree marked by some other explorer, and, although then only about 150 miles from Burke's depot, he was obliged, from shortness of supplies, to forego the journey to that place, and therefore he at once struck across about 40 miles for the main head of Cooper's Creek. Reaching this point, the party followed Cooper's Creek until they struck the Warrego, and then followed the Warrego until they came on the Darling. Here, being in settled country, Mr. Landsborough first heard of the fate of the party of poor Burke and Wills. In answer to questions from members of the society, Mr. Landsborough informed them that the most elevated land on the Flinders did not exceed 1,000 feet; that the wet season in tropical Australia began about January; that thunderstorms and rainy weather last until the end of April or beginning of May; that on the heads of the Gregory river the country is of a basaltic character, and on the Flinders quartz and iron bark trees (and therefore, probably, gold) abound. The dividing range between the Flinders and the Cooper's Creek country is estimated as being from 1,000 to 1,500 feet high. Mr. Landsborough said he had no doubt that the rivers on the east side of the range separating the Flinders from the Thompson were supplied by springs. He had never been to the west of the Thompson, and he saw no indications of southern streams. On returning to the Albert river from his expedition to the south-west, he came on another river, well supplied with water. In the water-holes, which he followed down for 70 miles, he found plenty of fish, and he thought these fish came up from rivers further to the south-west; but, as it was the dry season, he could see no water where it had spread for several miles in the wet season. Further down, he had no doubt he should have got on to a large river. The country he passed through "was so well grassed that the horses looked as if they had been stable-fed." So healthy are the shores of the Gulf of Carpentaria that "although living in the open air, and not having the best of food" (as Mr. Landsborough says), the country agreed admirably with him, and there was no fever or ague among any of the party. I have since had a few hours of Mr. Landsborough to myself, and he informs me that he has no doubt that within 12 months the whole of the country between this and the Gulf of Carpentaria will be taken up by settlers. Here, then, covering many degrees of latitude, salubrious, well grassed, and upon the whole much better watered than we had ever before surmised as probable, is the last extensive addition to the habitable world.

Proceedings of Institutions.

LEEDS WEST-RIDING EDUCATIONAL BOARD.—The report of this Board says that it was established in December, 1859, for the purpose of conducting the Examinations which might be held of members of Mechanics' Institutions and others, either by the Society of Arts, the Universities, or similar bodies. The system of Examination and the award of certificates and prizes as a stimulus to education was being largely extended, and it became indispensable to the value attaching to their results that the duty of conducting them should be undertaken by a responsible and impartial Board, comprised of the representatives of Educational Institutions and others interested in the great work of mental cultivation. It is not only designed to give a permanent character to the Examinations, but also to stimulate local efforts, so that a knowledge of the advantages to be gained might be disseminated as widely as possible. It was found that previous efforts in the same direction had been of an ephemeral and isolated character, and security for impartiality as well as systematic action to obtain the greatest possible benefits could only be achieved by the organisation of a united body. The first duty undertaken by the

Board was to conduct the Preliminary Examinations for the Society of Arts in March, 1860, and the Final Examinations in May following. Notice of the several arrangements was forwarded to all the Institutes within a reasonable distance of Leeds, and thirty-two certificates were awarded by the Society of Arts to nineteen candidates. In June, 1860, the Board undertook the management of the Local Examinations of Oxford University, which were held in the Civil Court, at the Leeds Town Hall, under the superintendence of the Rev. J. T. B. Landon on the part of the University. This Board offered local prizes, to senior candidates, of £2 for a first-class, and £1 for a second-class certificate, with half the value for every additional certificate gained by each candidate; and to junior candidates, £2 for the first, £1 10s. for every other first-class, and £1 for every second-class certificate. There were fifty-five candidates, and £31 was distributed in prizes. In March, 1861, this Board conducted the Preliminary Examinations of the Society of Arts, and the Final Examinations in the April and May following. The result was the award of thirty-two certificates to twenty-three candidates. In May, 1861, the Oxford University Local Examinations were conducted by this Board, in the Civil Court in the Leeds Town Hall, under the superintendence of the Rev. J. T. B. Landon on the part of the University. There were fifty-five junior and thirteen senior candidates. Four first-class, four second-class, and five third-class certificates were awarded to ten of the senior candidates; and eight first-class, four second-class, and thirty-four third-class certificates were awarded to forty-six junior candidates. The result was eminently satisfactory, the proportion of candidates who passed being eighty-two per cent., or twenty per cent. more than the whole kingdom. In priority of merit one of the junior candidates was No. 1, and one of the senior candidates No. 2 of the whole number examined by the University. The sum of £26 10s. was distributed by this Board in local prizes. In 1861, a Central Committee, consisting of two representatives of each Provincial and District Union and Adult Education Society, four members of the Council of the Society of Arts, the Chairman of the Society's Central Board of Examiners, and six representatives of Local Boards, was established in London in connection with the Society of Arts, the object being to promote uniformity of action, and a fixed standard in the Elementary Examinations of the Provincial and District Unions, Adult Educational Societies and other Local Boards. The duty of the Central Committee was to provide for common use a scheme of two elementary examinations consisting of two sets of papers, one suited for junior, the other for senior candidates, with corresponding forms of certificate to be awarded by the local authority under which the examination has been conducted. As a further privilege the certificate of a senior candidate, of sixteen years of age, is received, without any further previous examination, as a pass to the final Examinations of the Society of Arts, if accompanied by a certificate from the Local Board or Union of the candidate's fitness to be examined in the special subject in the Society of Arts' programme in which the candidate proposes to be examined. The elementary Examinations are held simultaneously, and are open to persons of either sex or any age. As, according to the scheme, the Examinations might be held in any place where candidates presented themselves, under proper supervision, this board obtained the necessary supply of papers and conducted Examinations at the Leeds Mechanics' Institution, Leeds Female Educational Institution, Thirsk Mechanics' Institution, Marske Mutual Improvement Society, Stocksbridge Mutual Improvement Society, and Wilsden Mechanics' Institution, the total number of candidates being 48 seniors and 69 juniors. The treasurer's account shows that the receipts up to December, 1861, have been £188 15s. 10d.; and that there is a balance in hand of £26 12s. 7d.

MEETING FOR THE ENSUING WEEK.

MON. ... Medical, 8½. Clinical Discussion. I. Mr. Everett Hart.
1. "On a Recent Case of Popliteal Aneurism Cured by Flexion, after failure of Pressure." 2. "On an Improved Tourniquet, with Index, and a case in which it was employed."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, October 17th, 1862.]

Dated 30th July, 1862.

2157. F. C. Warlich, 10, Alma-terrace, New Cross—Imp. in machinery for dressing and shaping stone. (A com.)

Dated 18th August, 1862.

2318. H. Boetius, 9, Rochampton-street, Bessborough-gardens, Pimlico—Imp. in fire-proof materials.

Dated 22nd August, 1862.

2348. H. Twelvrees, Bromley, Middlesex—Imp. in the preparation of washing powders, soap powders, and cleansing crystals.

Dated 29th August, 1862.

2402. P. W. Mackenzie, New Jersey, and S. W. Smith, Brooklyn, U.S.—Imp. in vehicles to be propelled by the rider.

Dated 4th September, 1862.

2444. J. Cook, 9, Fitzroy-place, Kentish Town—Imp. in carriages.

Dated 15th September, 1862.

2552. W. Watson and W. H. Watson, Harrogate, Yorkshire—An improved process or processes for the preparation of certain colouring matters from aniline.

Dated 19th September, 1862.

2567. W. Tytherleigh, 28A, High-street, Marylebone—An improved heater for ironing or pressing.

Dated 25th September, 1862.

2614. F. Tolhausen, 17, Faubourg Montmartre, Paris—An improved steam cultivator. (A com.)

Dated 26th September, 1862.

2624. W. Pettet, 11, Bulstrode-street, Middlesex—An improved covering for protecting vessels and forts from shot, shell, and other warlike missiles. (Partly a com.)

Dated 29th September, 1862.

2638. R. Griffiths, 69, Mornington-road, Regent's-park—Imp. in the construction of iron ships, and in the method of fastening metal sheathing thereon to keep them from fouling.

Dated 30th September, 1862.

2651. R. Hoyle, Newchurch, Lancashire—Imp. in machinery or apparatus for printing surfaces of woollen, mohair, cotton, and other fabrics.

2653. J. L. Hughes, Droitwich-road, Worcester—Imp. in producing ornamental patterns in gold or colour on porcelain, earthenware, glass and enamel.

2655. J. Wright, 12, Copthall-court, Throgmorton-street—An improved rotative travelling crane. (A com.)

Dated 1st October, 1862.

2657. P. G. V. Byl, 3, Upper Hyde park-gardens—A power conserver brake for utilising the power expended in stopping or retarding machinery, locomotive or other engines, and vehicles of any description when in motion. (A com.)

2658. R. W. Greenwood and C. J. Marson, 13, Gloster-crescent, Islington—A new and improved mode of using the exhaust steam of steam engines, by reconveying the same into the boiler.

2659. B. Donkin, Bermondsey—Imp. in bearings for shafts, axles, pivots, and sliding surfaces for the purpose of diminishing friction. (A com.)

2661. W. C. Cambridge, Bristol—Improved apparatus for washing clothes, applicable also as a churn.

Dated 2nd October, 1862.

2662. J. Gilchrist, Glasgow—Imp. in boring engines such as are used for mining purposes.

2664. W. C. Wilkins, Long Acre—Imp. in gas burners.

2665. E. Suckow and E. Habel, Manchester—Imp. in machinery for preparing, spinning, and doubling fibrous materials.

2666. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the permanent way of railways. (A com.)

2667. G. J. Firmin, Millwall, Poplar—Imp. in the treatment of certain salts of potash and lime.

Dated 3rd October, 1862.

2668. F. Ensor, West Bromwich, and W. Payne, Birmingham—A new or improved apparatus for regulating the pressure of steam in steam boilers, and for indicating when the water in steam boilers is too high or too low.

2669. J. Harrop, Manchester, and J. Wadsworth, Salford—Imp. in deodorising refuse, organic, fecal, and urinous matters, and in a method of utilising coal and other ashes, and in machinery or apparatus connected therewith for producing a portable manure therefrom.

2670. T. J. Robotham, Burslem, and E. Oswald, Stoke-upon-Trent—Imp. in apparatus for purifying "glaze," "slip," or other potters' materials.

2671. R. Broadbent, Leeds—Imp. in gas regulators.

2673. W. Clark, 53, Chancery-lane—An improved candlestick. (A com.)

2674. W. E. Gedge, 11, Wellington-street, Strand—An improved suction and lift pump, and apparatus connected therewith. (A com.)

2675. A. Dairymple, 18, Eyre-street, Sheffield—Imp. in the processes of depositing metals by galvanic action either with or without the aid of galvanic batteries, and in the ornamentation of metal surfaces thereby.

2676. W. E. Gedge, 11, Wellington-street, Strand—An improved marquetry or veneer saw, and machinery or apparatus connected therewith. (A com.)

2677. T. Greenwood, Leeds—Improved machinery for cutting staves.

Dated 4th October, 1862.

2678. J. Lee and W. Lee, Humberstone-road, Leicester—Imp. in traction engines and boilers for traction, locomotive, and other purposes.

2679. W. M. Muntz, Millbrook, Hants—Imp. in armour for the protection of ships of war, and other vessels and fortifications, from the effects of cannon shot and other projectiles.

2680. A. Barclay, Caledonia Foundry, Kilmarnock—Imp. in printing textile materials and fabrics, and in machinery therefor.

2681. W. E. Gedge, 11, Wellington-street, Strand—Improved means or apparatus by the use of which pierced or perforated cocoons may be spun. (A com.)

2682. S. Amphlet, Birmingham—Au imp. or imps. in ornamenting surfaces of wood.

PATENTS SEALED.

[From Gazette, October 17th, 1862.]

17th October.	12th October.
1136. R. Dennison.	1215. J. Shaw.
1141. R. Stuart, G. Stuart, and H. Hill.	1223. E. A. L. Negretti and J. W. Zambra.
1142. B. Rhodes.	1228. J. G. N. Alleyne.
1146. W. Rose.	1233. A. Boyle and T. Warwick.
1151. A. P. Tronchon.	1263. M. Henry.
1153. E. H. C. Monckton.	1275. J. Oxley.
1159. R. A. Brooman.	1324. P. V. Lefebvre.
1161. T. Attwood.	1329. T. Wilson.
1165. C. C. Creeke.	1361. T. Markland.
1167. T. Lea and S. Smith.	1364. N. Wood and J. Stockley.
1167. E. H. C. Monckton.	1900. C. Callebaut.
1177. W. Moir.	1912. W. Easton and G. Donkin.
1178. G. N. Bates.	1990. E. Townsend.
1180. W. Carpenter.	2052. O. F. Morrill.
1184. A. Hodgkinson.	2067. W. Tranter.
1186. G. T. Bousfield.	2075. W. Clark.
1191. J. Endean.	2097. W. Clark.
1196. J. Winsborrow.	2104. H. Rawson and F. Staples.
1197. G. Davies.	2256. C. A. Wheeler.
1201. F. Dangerfield.	2267. J. Cooper.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, October 21st, 1862.]

October 14th.	October 16th.
2357. J. H. Brown.	2364. S. Newberry and H. Moore.
October 15th.	2385. A. S. Rott.
2380. J. Higgins and T. S. Whitworth.	2448. J. W. Hackworth.
October 18th.	
2396. J. Bruckshaw, H. Bruckshaw, and W. S. Underhill.	2398. R. Hobson.
	2414. P. Jones.
	2462. R. A. Brooman.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, October 21st, 1862.]

October 13th.	October 16th.
2354. T. Valentine, D. Foster, and G. Haworth.	2336. S. Statham.
October 15th.	October 18th.
2311. E. Wilkinson.	2345. W. Basford.

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4515	Oct. 15	{ Improved Internal Toothed Wheel for Reaping Machines }	Adam Carlisle Bamlett...	Middleton Tyas, near Richmond, Yorks.
4516	„ 18	Tho a Writing Case	George Frederick Busbridge..	East Malling Mills, Kent.

Journal of the Society of Arts.

FRIDAY, OCTOBER 31, 1862.

NOTICE TO MEMBERS.

The One-Hundred-and-Ninth Session of the Society will commence on Wednesday, the 19th November, at 8 o'clock, when Sir THOMAS PHILLIPS, F.G.S., Chairman of the Council, will deliver the Opening Address. The Chair will be taken at Eight o'clock on the following Wednesday Evenings :—

1862. November	—	—	19	26	
„ December	3	10	17	—	—
1863. January	—	14	21	28	
„ February	4	11	18	25	
„ March	4	11	18	25	
„ April	—	8	15	22	29
„ May	6	13	20	27	
„ June	—	—	—	24*	

For the Meetings previous to Christmas, the following arrangements have been made :—

NOVEMBER 19.—Opening Address by Sir THOMAS PHILLIPS, F.G.S., Chairman of the Council.

* * * On this evening the Medals which were awarded by the Council for Papers read at the Weekly Evening Meetings during the last Session, will be distributed.

NOVEMBER 26.—“On the Utilization of Peat, with reference more particularly to the Manufacture of Hydro-Carbon Oils.” By B. H. PAUL, Ph.D.

DECEMBER 3.—“On Thompson’s Process of Boatbuilding by Machinery.” By D. PUSELEY. Illustrated by Models.

DECEMBER 10.—“On the Construction of Labourers’ Cottages and Sanitary Building Appliances.” By JOHN TAYLOR, Jun., Architect.

DECEMBER 17.—“On the Mines and Minerals of the United Kingdom.” By ROBERT HUNT, F.R.S., Keeper of Mining Records, Government School of Mines.

GENERAL INDEX.

A general Index to the first ten volumes of the *Journal* will shortly be published, which should be bound with the present volume. Members who desire to have copies are requested

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

to apply to the Secretary before the 1st of December, in order that a sufficient number may be printed.

INTERNATIONAL EXHIBITION OF 1862.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty’s Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty’s Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s. ; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors.

It was the intention of the Council to issue the volume complete in the early part of September, but as several of the Reports have not yet been received by Her Majesty’s Commissioners, the completion of the entire work has been unexpectedly delayed; the Council, however, unwilling to defer the publication of the Reports already completed, have issued to the subscribers those that have been received up to the present time. When all the Reports are delivered, the parts now issued to subscribers will be exchanged, if uninjured, for the perfect volume, bound or unbound, as desired. Individual reports are sold separately; for prices see advertisement.

INTERNATIONAL EXHIBITION OF 1862.—VISITS OF SCHOOLS.

The following is a continuation of the Schools reported to Her Majesty’s Commissioners as having entered the Building from the 17th to the 25th of October :—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Oct. 17	Homerton	{ British Asylum for Deaf and Dumb Females }	J. G. Simpson, Esq.... ..	16	16
„ 18	Hampstead	Teachers of National	Rev. W. Wignan	32	
„ 20	Bedford	Union... ..	Subscription	70	
„ „	Paddington	St. John’s (Servants)	The Hon. Mrs. A. Kinnaird	25	32
„ „	Bexley (Kent)	National	F. Dashwood, Esq.	97	
„ „	Coventry	Bablake	Trustees	73	
					265

RETURN OF SCHOOLS (*Continued*).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
" 21	City of London	{ Foundation Girls, St. Dunstan's- in-the-West }	Mr. Edmund Waller ...	11	262
" "	{ Wallingboro', near Northampton .. }	Union	Subscription	24	
" "	{ St. George's-in-the- East }	Raine's Asylum	The Trustees	39	
" "	Shooters' Hill	National	Subscription	30	
" "	Kilburn-park	Sunday	Subscription	50	
" "	{ Kettering, near Northampton .. }	Grammar	Own Expense	23	
" "	Essex	Havering	S. C. Hope, Esq.	37	
" "	{ Kettering, North- ampton }	Sunday	Subscription	20	
" "	Snaresbrook	Merchant Seamen's Orphan Asylum	J. Adams, Esq.	13	
" "	{ Kettering, North- ampton }	National	Rev. T. H. Madge	15	
" 22	{ St. George's, Hano- ver-square }	United Day?	Subscription	700	1082
" "	{ St. James's, West- minster... .. }	Burlington	Subscription	42	
" "	{ St. George's, Hano- ver-square }	Stewart's Foundation	Captain A. Stewart... ..	34	
" "	City of London... ..	Bridge Ward	Subscription	33	
" "	Bloomsbury	British	Subscription	48	
" "	Royston (Herts)	Union	Subscription	33	
" "	City of London... ..	Broad-street Ward	Subscription	102	
" "	Halfway-street, Kent	Lamorly	Lady Louisa Mills	32	
" "	Cranford, Middlesex...	Private	Rev. W. H. Hickiston ...	9	
" "	Aldershott... ..	{ Choir Children of Royal En- gineers and Military Train }	Rev. J. C. Edghill	15	
" "	{ Attleboro', War- wickshire }	{ Teachers and Choir of Church Sunday }	Subscription	34	
" 23	Hounslow	National	Subscription	124	822
" "	Westminster	St. Margaret's	Churchwarden White ...	18	
" "	Edmonton... ..	Latimer's	The Trustees	48	
" "	Hampstead	Soldiers' Daughters' Home	{ Committee of Indian Mutiny Relief Fund }	25	
" "	Stockwell-green	British	Mr. Goodchild	12	
" "	Gloucester... ..	St. Mark's Choir	Subscription	16	
" "	{ St. George's-in-the East }	Plasket Industrial	Own Expense	27	
" "	{ Market Harborough... Sunday }	Choristers	Subscription	35	
" "	Islington	Shoe-black Brigade... ..	Subscription	21	
" "	Rye, Sussex	National	{ W.A. Mackinnon, Esq., M.P. }	36	
" 25	Tulse-hill, Surrey ...	Grenada-house	E. R. Shaw, Esq., B.A. ...	460	
				23	23

VISITS OF WORKMEN.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building from the 20th to the 25th of October:—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
Oct. 20	Packing-case Makers.. ...	Old Bond-street.. ...	Messrs. Harrow & Son... ..	20
" "	Agricultural Labourers	Bodicote House, Oxon ...	W. Caliss, Esq.	17
" "	Feather Dressers	Old Kent-road	Ellington and Ridley ...	180
" "	{ Drummers and Band Boys from various Regiments }	Aldershott... ..	Rev. A. H. Hore	31
" "	Timber Merchants' Employés ...	Rotherhithe and Millwall..	H. P. Burt, Esq.	113
" "	Workmen of the Parish	Marylebone... ..	The Vestry and Parishioners	240
" 21	Farm Labourers.. ...	Walesby, Lincolnshire ...	Mr. T. F. Kerman... ..	14
" "	{ Hartley Bottle Company's Ware- housemen }	Upper Thames-street, City	The Company	26

VISITS OF WORKMEN (*Continued*).

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBERS.
" 21	Sieve makers	Long-lane, Boro'	Messrs. Bedford & Steer ...	71
" "	Slate Workers	Stratford, Essex	A. A. Robinson, Esq.	71
" 22	Agricultural Labourers	{ Mount Pleasant Farm, Buckland, Berks ... }	Geo. Davy, Esq.	33
" "	Agricultural Labourers	Buckland House, Berks ...	Sir Wm. Throckmorton, Bart.	70
" "	Agricultural Labourers	Spray Farm, Hungerford...	Henry Woodman, Esq. ...	41
" "	Agricultural Labourers	Woolhampton House, Berks	James Blyth, Esq.	23
" "	Estate Labourers	Harefield Grove.. ...	Robert Baines, Esq.	28
" "	Tanners	Shrewsbury	James Cook, Esq.	26
" "	Lead Workers	Shrewsbury	Messrs. Burr, Brothers...	35
" "	Labourers and Residents	{ Littletons Evesham, Worcester }	{ Rev. H. G. Fawcett, Rev. S. Yorke, and H. Simp- son, Esq. }	38
" "	Evening Class Students	King's College, Strand ...	Individual Subscription ...	30
" "	Tenantry	Wilton	Lady Herbert	450
" 23	Builders' Workmen... ..	St. John's-wood.. ...	Mr. Richard Thomas	200
" "	Glass Bottle Makers	Yorkshire	Aire and Calder Bottle Co....	340
" "	{ Members of St. Mark's Working Men's Institute }	North Audley-street ..	Subscription	25
" "	Agricultural Labourers	Litworth, Oxon.. ...	Wm. Hatton, Esq.	58
" "	Music Publishers' Employés	New Burlington-street ...	Messrs. Robert Cocks and Co.	50
" 24	Serjeants of the Coldstream Guards	Wellington Barracks..	Lieut.-Colonel Dawkins ...	38
" "	Clothiers' Warehousemen.. ...	Friday-street, City ...	J. C. Harvey	14
" 25	Serjeants of the Coldstream Guards	Wellington Barracks..	Lieut.-Colonel Dawkins ...	20

INTERNATIONAL EXHIBITION.

SURGICAL INSTRUMENTS, CLASS 17.

At a meeting of the Exhibitors, held on the 22nd inst., it was determined by the undersigned not to sell any of their goods in the Exhibition Building, and that a card be placed in each case to that effect:—

W. H. Bailey.
H. H. Bigg.
W. Cobs and Co.
James Coxeter.
W. F. Durroch.
F. G. Ernst.
Evans and Stevens.
John Evrard.
J. and J. Ferguson.
Gray and Halford.
W. R. Grossmith.
Mark Lindsey.

F. Longdon and Co.
W. Matthieu.
John Millikin.
Joseph Pratt.
Charles Rein.
H. Simpson.
W. H. Spratt.
Frederick Walters.
Thomas Weedon.
John Weiss and Son.
Whicker and Blaise.
John White.

mediately affected, but their future requirements compromised and endangered.

Very few persons have even an approximate idea of the enormous consumption of timber which takes place annually in France. It is generally believed that the ship-builders are the principal consumers, and this would be true to a certain extent if it only related to timber of extraordinary or unusual dimensions; but as regards quantity, the consumption for shipping is almost insignificant, as evidenced by the summary of statistics given below, collected by an inspector of forests attached to the Central administration.

STATISTICAL SUMMARY OF THE ANNUAL CONSUMPTION OF
TIMBER IN FRANCE.

	Cubic Metres.	or	Cubic Feet
Naval and Merchant service ...	80,000		2,825,328
Artillery and Engineers' do. ...	30,000		1,059,498
Railways	200,000		7,063,320
Buildings	1,600,000		56,506,560
Cooperage	1,600,000		56,506,560
Vine props	2,000,000		70,633,300

This statement does not comprise timber imported from abroad. It is at the outside a minimum; first, because it estimates, at much too low a figure, the consumption by the railways; and secondly, because it does not take into account the timber used in mines for propping up the galleries; in the building and repair of canal and river boats; in the hop-grounds; in wheelwrights' work; and in the manufacture of furniture, &c., &c. Mons. Burat, Professor of Commercial Statistics, of the Institution of Arts and Sciences, does not hesitate to estimate the annual consumption of timber in France, in building and manufactures, at 10,000,000 cubic metres, or 353,166,000 cubic feet, to which must be added 30,000,000 cubic metres, or 1,059,498,000 cubic feet for firewood, and 15,000,000 cubic metres, or 529,749,000 cubic feet made into charcoal.

Now the produce of the timber sales, under the management of the Inspector of Forests, varies between 70 and 80 million of francs, or £2,800,000 and £3,200,000 each year. Allowing, therefore, that the private forests, the area of

PREVENTION OF DECAY IN TIMBER FOR
SHIP-BUILDING AND OTHER PURPOSES.

An essay on the subject of Decay in Timber, and its prevention by a new system of carbonisation, has been recently published by M. de Lapparent, Inspector-General of Timber for the French Navy, and it is stated that the method of preservation therein described is extensively adopted at the present moment in the French Government dockyards for their line-of-battle ships, as well as by railway companies both in that country and Spain, for the preservation of their sleepers, &c. It has been thought that a translation of portions of this work would be interesting to the readers of the *Journal*:—

It is stated in the preface that it is a fact established by the agricultural statistics of France, that the annual consumption of timber in that country considerably exceeds the re-production, and, by the continued impoverishment of the land in that particular, not only are the interests of the agricultural and industrial population im-

which is equivalent to the whole of the government forests,* produce the same sum, the maximum amount arrived at is only 160,000,000 francs, or £6,400,000.

This amount, in fixing the average price of the cubic metre (or $\frac{1}{10}$ cubic foot) of timber for building and other purposes at 30 francs (24s.) only, will be more than absorbed by this calculation. The forests, therefore, will be absolutely inadequate to meet the enormous consumption above-mentioned, if the clearings (which on an immense scale are continually taking place) and the scattered timber which marks the division of properties are not taken into account.

Unfortunately the landholders are foolishly advised, and object to having timber round their fields; neither will they replace the trees they cut down, while the gradual diminution of individual wealth is constantly urging on the conversion of the forests into cultivated land. The consequence is, that in proportion as the consumption increases, the supply diminishes; the value is thereby augmented, and the wish to realise quickly adds to the impoverishment, of which the disastrous effects are already felt in many parts of France. It is therefore of great importance to discover a method of prolonging the durability of timber for building purposes, and, by diminishing the consumption, to arrest this scarcity.

The author states his opinion that the rapid decay of modern-built ships is traceable to this cause alone—that we cannot leave them sufficiently long on the stocks to be seasoned. Such also will be the fate of the magnificent cuirassed frigates, if some efficacious remedy be not speedily applied. The risk is even so much the more to be dreaded for the new ships, as the casing of the upper part of the broadside with the iron plates must have the effect of increasing considerably the inertia of the sides; and the variations of her draught during stormy weather will be much greater, when, by reason of the decay of the ribs, the bolting which fastens the planks to the timbers will no longer have sufficient hold.

The following points may be considered separately:—
1st.—The selection and employment of timber, with regard to its natural qualities.

* The area of the forests in France, at the period of the conquest of the Gauls by Julius Caesar, is estimated at 40,000,000 hectares, or—
Hectares. Acres.
Royal Forests 1,100,000 or 2,720,960
Forests belonging to the Communes and Public Institutions..... 1,900,000 4,699,840
Private Forests 3,500,000 8,657,600
so that the State, which ought to be the sole proprietor, is now the owner of the smallest portion of forest land.

2ndly.—The preservation of store or yard timber, and its preliminary artificial seasoning for building purposes.

3rdly.—The precautions to be taken in ship or other building, and the preparations to be applied to timber, either to neutralize the agents of decay, or to render it impervious to them.

I.—THE SELECTION AND EMPLOYMENT OF TIMBER.

After some remarks upon the oak grown in France, and the mode of selecting the best qualities, the author goes on to say:—

With regard to foreign timber, that grown in Italy and on the shores of the Adriatic is the best that can be used for the ribs of ships, and should be carefully sought for. For planking, ceiling, and longitudinal joining, Indian teak (as famous for its durability as for its specific lightness and toughness) should be selected. An opportunity will also soon occur of largely extending the working of the immense timber forests in Guyana, of which certain species of timber, from some experiments made by the author, give promise of qualities altogether unexceptionable—such as elasticity, strength, and durability.

In Guyana the forest trees do not grow in clusters, like the oak and beech in France; on the contrary, several species, without order or any relative analogy, are mingled together, so that, for any good to be done, it would be absolutely necessary to select a certain number of species. Fortunately those which are met with in the greatest abundance, are also those which offer the greatest resources for ship-building—such as the Angélique, the Coupi, the Violet-tree, and the Wacapoa.

From the specimens procured by the author, he cut a certain number of lengths of wood about 20 millimètres (or three-quarters of an inch) thick, which, by the machine used at Cherbourg for experiments of this kind, have been tested with other lengths cut from planks of forest oak taken from the stores of the same port, and with another length of Moulmien teak bought in England to line the broadside of the *Normandie* frigate under her iron plates. He added to these some lengths from a sample of Indian teak of superior quality; also lengths of beech and poplar, which had been injected with sulphate of copper.

Below is a table of the average results of the first series of experiments, in which three lengths of each species were subjected to the machine or steel-yard; all had been cut for some time, and appeared equally seasoned; the space between the points of support was 20 centimètres, or about eight inches. An apparatus made for the purpose enabled him to calculate the elasticity almost to the tenth of a millimètre.

TABLE.

	Weight of the Cube Metre (35½ cubic feet).	AMOUNT OF PRESSURE.		ELASTICITY.			CO-EFFICIENTS		
		At yielding point.	At point of fracture.	Under a pressure of 220·10.	Extent of Elasticity.	At commencement of Fracture.	Appearance of Fracture.	of Elasticity.	of Fracture.
		lbs.	lbs.	Feet.	Feet.	Feet.			lbs.
Forest Oak (French)	1644	276	331	0,7874	0,13778	0,21249	short.	62,500	124
Moulmein Teak (superior)..	1435	441	634	0,03937	0,10236	0,14566	in splinters	125,000	238
Moulmein „ (soft)	1302	386	441	0,07086	0,14960	0,17715	short.	69,500	168
GUYANA TIMBER.	Angélique	1700	508	607	0,03543	0,11417	splinter.	140,000	225
	Coupi	2207	500	551	0,04724	0,14173	„	104,000	207
	Violet-wood	1865	717	883	0,03543	0,13779	„	140,000	331
	Wacapoa.....	1858	607	662	0,03937	0,15768	„	125,000	248
	Balata	2362	828	1048	0,02362	0,13779	„	207,500	370
	Courbaril... ..	2075	772	938	0,01967	0,14960	„	250,000	351
	Taoub (yellow)	1910	551	662	0,03543	0,14172	„	140,000	248
	Saint Martin	2053	717	772	0,03543	0,14172	„	140,000	289
	Black Cedar	1766	607	662	0,04330	0,13385	„	114,000	289
	Beech (injected with sulphate of copper)	1744	331	386	0,05511	0,14172	short.	89,000	136,10
Poplar (injected with sulphate of copper)		86010	22010	276	0,12204	0,12204	splinters.	41,500	103,3

From the preceding table it is evident that if we represent by an unit either the comparative elasticity of the oak, or its power of resistance to fracture, we shall have the following series of proportionate numbers corresponding to the other species :—

DESCRIPTION OF TIMBER.	PROPORTIONATE NUMBERS.	
Forest Oak..	1,000	1,000
Teak (superior)..	2,000	1,920
Teak (soft)..	1,100	1,330
Guyana Timber {	Angélique... ..	2,250 1,830
	Coupi	1,760 1,660
	Violet-wood	2,250 2,650
	Wacopoa	2,000 2,000
	Balata..	3,325 3,150
	Courbaril	4,000 2,825
	Taub (yellow)..	2,000 2,000
	Saint Martin	2,000 2,325
Beech (injected with sulphate of copper).	Black Cedar	1,820 2,325
		1,420 1,100
Poplar	0,665	0,830

Without wishing to attach any specific importance to these experiments, which require to be repeated and varied, the relative inferiority of the soft oak of French forests, as regards elasticity and power of resistance to fracture, cannot but be remarked. It will also be observed how unsatisfactory was the teak brought from England for the lining of the iron-plated frigate. It appears that the forests of Moulmein are exhausted, and in that locality we can only find timber of a mediocre quality. The author's opinion is, that we must now go to the shores of the Bangkok, in the kingdom of Siam, where immense forests, yet unexplored, are to be found. The high numbers to which the several species of Guyana timber refer are well worthy of attention, as well as the identity which appears to exist between the Angélique and the Moulmein teak of superior quality, which justifies the distinctive appellation sometimes given to the Angélique as "the Guyana teak."

But whatever may be the importance attributed to the qualities of elasticity and strength, there is one which, in ship-building, ought to take precedence of all the others, and that is durability. It is true that in general (and experience has shown that this rule applies strictly to the oak) the strongest and most tenacious timber is at the same time the most durable; but when there is a question of the other species, the rule does not always prove correct, so that to form a true and just opinion of the quality of timber, it is necessary, by direct experiments, to estimate its relative durability. The author gives the details of those made by himself. Taking a new set of lengths chosen from the same specimens of timber, he put part of them in a box with alternate layers of moist horse dung, and the box was then hermetically closed. The other lengths were driven into damp earth, a little more than half their depth. After remaining six months in these positions, the several lengths were withdrawn and subjected to the steelyard. Some of them had lost more in the dung, and with the others the contrary was the result.

The average of the two losses is recorded in the following table (see next column).

It is impossible not to be struck with the astonishing superiority in every point of view of the several species of timber from Guyana.

The Angélique especially appears destined to render the greatest service to ship-building, for in addition to its qualities of elasticity, strength, and durability, its density does not exceed that of the common oak. On the contrary, the other species are a little heavy, without however being excessive in that respect. Their place will be at the bottom of the ship, while the Angélique will be advantageously substituted for teak on the broadside under the iron plates.

TABLE OF COMBINED LOSS OF STRENGTH OF DIFFERENT SPECIES OF TIMBER, AFTER REMAINING SIX MONTHS IN THE EARTH OR DUNG.

DESCRIPTION OF TIMBER.	Loss per Cent.	
Forest Oak..	30	
Teak (superior)	15½	
Teak (soft)..	25	
Guyana Timber {	Angélique	5
	Coupi	0
	Violet-wood	0
	Wacapoa	0
	Balata..	10
	Courbaril	12½
	Taoub (yellow)	31½
	Saint Martin	14½
Black Cedar	22½	
Beech (injected with sulphate of copper)...	30	
Poplar	10	

II.—PRESERVATION OF STORE OR YARD TIMBER AND ITS PRELIMINARY ARTIFICIAL SEASONING FOR WORKING PURPOSES.

It is well known that the trunks of trees grow by the superposition of annual concentric layers, and consequently are composed of wood of very different ages. For example, an oak of 150 years encloses in its centre and at its foot wood of the same age, and at the surface and top wood of a year old. Arrived at a certain age—but varying exceedingly in quality according to climate, exposure, and soil—vegetation ceases, and the oldest layers begin to ferment and decompose. We become aware of this when we see the topmost branches of the tree prematurely lose their leaves, or when they remain without foliage in the spring. Then we say the tree is withering, or on the decline. That is an immediate blemish, and the branches which are touched with it are liable to perish in the centre, even before they are brought into use. When, however, this defect is not very apparent, it will not be necessary to exaggerate the danger; and those even slightly acquainted with the laws of the resistance of solids very well know that the central portion of a piece of timber bears a very little part in the resistance of the log, as regards either fracture or tension. But it is not prudent to allow trees to attain that limit beyond which the vital principle begins to decay.

Timber, sound at the heart and exempt from all accidental and local defects, only decays under the influence of certain causes, which it is important carefully to define, in order that we may be enabled to combat them successfully. When a tree is felled it encloses in its fibres as well as in its capillary channels a considerable quantity of sap, which is nothing else but water charged with gummy, saccharine, saline, mucilaginous, and albuminous matters. In this state the latter are very liable to ferment, but they lose this liability when, by the evaporation of the sap, they pass to a dry and solid state; so that the first suggestion which naturally presents itself to the mind, is to subject the timber to a lengthened seasoning.

Unfortunately timber in general, and particularly that of the oak species, requires a very long time before the mass is thoroughly seasoned. This arises partly because (the wood being inaccessible to heat) the sap, excepting that immediately below the surface, does not exude in vapour—the only form in which it could escape quickly—and partly from the incrustation and the narrowness of the channels, which present a more or less powerful obstacle to the evaporation of these exhalations.

A natural seasoning would be sufficient for specimens of moderate thickness, such as boards for inlaying and panelling, &c., &c., or even for some thicker woods, from which in working up they take off only a thin shaving from the surface—for example, the planking of ships; but

it would be entirely useless as regards rough square logs intended to be used as ribs, and from which from 40 to 50 per cent. of the original mass is taken off. Then, however seasoned the exterior may appear, a considerable degree of dampness is found under the fibrous tissue of the wood. Exposure of the timber to free air for some length of time can alone remedy this evil; and, as I before stated, such was the course pursued with all ships formerly built, when left to season on the stocks for 10, 15, and even 20 years.

Now that circumstances oblige us to forego this excellent plan, it is imperative to replace it by artificial and speedy methods. They consist—

1st.—In depriving the timber of the greatest possible quantity of sap, and consequently of the fermenting principles therein contained.

2ndly.—In subjecting felled and sawn timber, before putting together, to an artificial seasoning.

3rdly.—In charring or scorching the surface of the wood by means of a slight carbonisation when the work is finished.

It is a well known fact that the longer wood has remained under water, the more rapidly it dries; for instance, in Paris, everyone is aware that the firewood brought out of the river is less green and burns better than that brought by waggon or boat. In reflecting on the cause of a phenomenon apparently so paradoxical, this conviction is forced upon us, that it is of the same nature (or from the same cause) as that which causes the "Endosmose" and "Exosmose" discovered and described by the celebrated naturalist, Dutrochet.

When timber is submerged, the sap, by reason of the matters which it holds in solution, is denser than the pure water; moreover, it is enclosed in fibres or channels permeable at the side. The phenomenon of Endosmose ought therefore to be gradually produced, and to extend itself, as by a kind of cementation; so that, in supposing the surrounding water to be flowing, or at least changing, this water will conclude by occupying, if not altogether, at least in a great degree, the place of the sap, which will have issued forth, carrying with it the fermenting principles with which it is charged. The timber, therefore, which has remained sufficiently long in the water ought to be much less susceptible of fermentation than that seasoned only by the atmosphere. Besides, as pure water evaporates much easier than that which contains certain principles, this timber ought to be seasoned much sooner than the other—a fact confirmed by long experience.

If the preceding explanations are well founded, we should conclude from them that the Endosmose will develop itself with so much greater rapidity, as there shall be a greater difference of density between the surrounding fluid and the sap. On the contrary, the denser the liquid in which the timber is immersed, so much longer will the Endosmose be retarded, and, if there is any difference between the specific gravities of the sap and the water, Endosmose will not be produced.

This remark is most important, as it proves that timber cannot be seasoned in salt water, but in fresh, or at the most, in brackish water. As to the sea, it can only be regarded as an economical storeyard. The submersion of building timber becomes now so much the more necessary, as floating is very seldom resorted to, the greater part of the timber being brought to the ports by railway.*

With regard to the question, "How long it will be necessary to allow the timber to remain in water in order that it may get rid as much as possible of its sap?" the author recommends:—One year in river water, two years in fresh water (frequently changed),

* In particular, preliminary immersion is indispensable for Guyana timber; which, as the produce of a country warm and damp in the extreme—and where vegetation never stops, we may readily say never—contains a prodigious quantity of sap. To the neglect of this precaution we must, without doubt, attribute the unfortunate results appearing in some timber brought from that country and worked up in the French dockyards thirty years ago.

and three years in brackish water (which should be always changing). At the close of these several periods, the boards intended for planking should be taken out to be put in store; or they might be left to season themselves naturally for two years, at least, before being worked up. As to the rough timber for ribs, seasoning in store would be, as already stated, totally insufficient; and it would be requisite after shaping, but before putting together, to subject it to an artificial seasoning. There have been many plans of this description in use for some time in France and England, but they have only been applied to wood of moderate thickness, such as boards, flooring, and wainscoting.

The plan adopted in London is the injection, by means of a ventilator, of hot air into the drying stove where the wood is placed; by this the temperature is gently and gradually raised until it reaches boiling heat. But, as wood is one of the worst conductors known of caloric, if this plan is applied to large logs, the interior fibres still retain their original bulk, while those near the surface have a tendency to shrink, the consequence of which would be cracks and splits of more or less depth. If, however, this defect is not too apparent, it would have little influence on timber used as ribs, but would render it unfit for planking.

Another method in operation at this present time at Tourlaville near Cherbourg, for which the inventor, M. Guibert, has taken out a patent, appears, in the author's opinion, to give at once more expeditious and sure results than those obtained from the use of dry and hot air. It consists in filling the drying stove with smoke produced by the distillation of certain combustible matters, such as saw-dust, waste tan, and smith's coal, &c. By means of a ventilator, ingeniously arranged, a rotatory movement round the logs laid to season is given to the smoke, so as to obtain an average uniform temperature in every part. By this plan, as the distillation of combustibles is always attended with a considerable discharge of steam, all cracks and splits appear to be prevented.

The apparatus invented for the same purpose by Messrs. Lége and Fleury Pironnet, for the injection of sulphate of copper into beech and poplar, may likewise be used. This apparatus is composed of a cylinder 15 or 16 mètres (or from 49 to 52 feet) in length, with an opening of about two mètres (or 6½ feet), into which, after the wood is placed and the opening hermetically sealed, a jet of steam is introduced, intended at first to enter the timber and open its pores for the purpose of obtaining a sudden vacuum, so as to establish at any time a communication between the interior of the cylinder and the cold water condenser, like Watt's condenser, at the same time that the air-pump is put in action. The vacuum caused is very powerful, equal to an altitude of 65 centimètres, or 25½ ins. of the barometer. Under the double influence of the heat and the vacuum, the sap is quickly evaporated from the wood as steam, and ejected from the cylinder by the air-pump, so that in a very short time the wood is fully prepared to admit the preserving liquid through the entire bulk. If the wood is only required to be seasoned, a current of warm air is substituted for the liquid, and to this a certain proportion of sulphuric acid should, in the author's opinion, be added. Without doubt, this method of seasoning would be the quickest, and we should thereby avoid the cracks and splinters which are nearly always produced when dry and hot air only is applied.

The principal drawbacks to the use of the apparatus are its complicated details and heavy cost, but the result to be obtained is most important.

III.—PRECAUTIONS NECESSARY TO BE TAKEN IN ERECTING THE APPARATUS, EITHER TO NEUTRALISE THE AGENTS OF DECAY, OR TO RENDER THE TIMBER IMPERVIOUS TO THEIR INFLUENCE.

A species of embalming was one of the oldest methods adopted. We are aware that from time immemorial

either aromatics or poisons have been successfully employed in the preservation, for an almost indefinite period, of defunct organic bodies; and as animal substances and grasses, which otherwise decomposed with the greatest rapidity, are those whose tissues most readily admit preserving liquids, it is of course with them that the plans of preservation will best succeed. The effect of the poisonous solutions employed appears to be an insoluble combination of those solutions with the albumen of organic matters, by arresting their fermentation, which always precedes cryptogamic or fungoid vegetation, or the deposit of the eggs of xylophagous insects.

Dr. Boucherie's plans for preserving timber have some connection with this method; and although he has not succeeded in their adaptation to the most valuable building timber, he will not the less have rendered an immense service to France, by substituting in lieu of oak (the scarcity of which is continually increasing) other kinds of timber suitable for many purposes, and especially for railways. In fact, experience has shown that timber is permeable, at least by aqueous solutions, only so long as the sap channels are free from incrustation. Such in general, is the case with beech, elm, poplar, hornbeam, and the service tree, the capillary tubes of which are always open, or at least close very slowly. At the same it may be said that there must remain even in these species some parts impervious to injection, while it is almost impossible but that a certain portion of the fibres will be more or less incrustated.

The sap woods, on the other hand, of every species, appear quite pervious; and on this quality is based the preparation of telegraphic poles, which, as every one knows, are made of young fir trees stripped of their bark, the inside of the fir, like that of most of the common resinous trees, being impermeable. But in all these cases these preparations are only to be applied to wood in the store or yard, or to that prepared but not put together.

The principal cause of the fermentation—always the forerunner of decay in timber—is the presence of an atmosphere of warm, damp, and stagnant air. On one of these three conditions being removed, the durability of timber would be immediately prolonged. Thus it is that we cannot contemplate without a feeling of admiration the woodwork of the oldest mansions or churches. The joists of the houses built by our ancestors last almost for ever, because they are in contact with air which is continually changing. Now, on the contrary, we foolishly enclose them between a ceiling of plaster (always very damp to begin with) and a floor; they rapidly decay, and sometimes cause the most serious disasters, of which it is impossible to be forewarned. The timbers of our ships, placed as they are between the outside planking and the inside ceiling, are in the same predicament; the stagnant air of the channels is heated by the vicinity of the hold, and at the same time is charged with moisture, as much from the constant emission of aqueous vapour from the wood, as from the leakage of water through the seams, which, during rough weather, always open a little. Thus it is the timbers decay with frightful rapidity, endangering either the ship or the health of her crew.

The bolting ought to be considered as the only safeguard of a ship; for the planking, which enables her to float, only discharges that duty in proportion as it is solidly fastened to the ribs. But the grip of a bolt being proportionate to the friction that it experiences in the channel where it is driven, and that friction proportionable to the spring developed in the wood when the bolt is driven in, if the sides of the channel are altered, the adherence of the bolt is considerably lessened, the planks play one upon the other, eject the caulking, and allow water to penetrate through the seams. Under these circumstances the ship is no longer seaworthy, and must seek the nearest port to be repaired.

The signs of decay in timber are fungi. Some of them, now and then, are microscopic, and owe their existence to the sporules deposited on the surface; while fermentation,

generated by prolonged contact with warm, damp, and stagnant air, is as a soil where seeds sow and nourish themselves. When a ship is under repair we are often astonished at the appearance of fungi, enormous in length or bulk, which are visible on all the surfaces of the circumference of the ribs in contact with the planks; and we may observe that the depth of the decay, from the outside to the inside, is in proportion to the size of the fungi. In general, however, they are not so abundant in the channels, or on the surface lengthways. This tends to show that the air in the fibrous tissue of the wood is not absolutely stagnant, the differences of the temperature of the several layers causing a slight current of rising and falling air. It is not the same even with the thin draughts of air enclosed on the surface in contact with the planking and the timbers; the friction that these draughts experience is sufficient to render their stagnation complete, it being a well known fact that timber decays principally when in contact.

The causes and the development of decay in timber having been stated, the nature of the remedies, preventive or repressive, may be enumerated in the following order:—

1st. By disturbing the stagnation of air in the channels or space and room of the timbers.

2ndly. By getting rid of the confined air in contact with the timber.

3rdly. By preparing the surface of timber in such a manner as to prevent the engendering and growth of fungi.

4thly.—By impregnating the air in contact with the timber with a substance destructive to the sporules of the fungi.

It is a common error in building the hull of a ship to isolate the channels, and cut off their communication with the outer air—a bad practice, which must be abandoned. Formerly they were sparing of bull's eyes in the lower decks, but though the want of light added to the dirt of the hold, the advantage of them in caulking the seams was found too great to allow their use to be altogether discarded.

A very simple plan, and one without any inconvenience, to bring all the air channels into communication, would be, at equal distances on the surface of the length of the ribs, to bore holes about three centimetres ($1\frac{1}{8}$ inch) in diameter, which would not materially weaken the main timbers, equally taking care to arrange the half circular channeling on the lateral surface of the bends which keep apart the ribs. By these precautions, the air confined in the channels would be continually renewed; moreover, a quicker circulation in that air might be produced at any time by means of a small ventilator, similar to that used in mines, the handle of which would fit into one of the holes, all the others on the same side, one excepted, being shut. By these simple means the air channels would be rendered wholesome, and the fermentation on the surfaces of the length of the ribs be prevented; but they would not be sufficient to freshen the little draughts of air confined between the planking and the ceiling, which are retained by friction, so that it would be necessary to use some other means to get rid of them. They now exist only because, timber having but little compressibility, the surfaces in contact cannot mould themselves, which it is indispensable they should do, exactly one upon the other; but this can be accomplished by interposing an elastic substance, such as india rubber, either compressible like felt, or a cement like that of glaziers, but made with oil without driers, and mixed with a certain proportion of flour of sulphur. This last method the author thinks particularly worthy of trial.

But the most important plan is to prepare the surface of timber in such a way as to prevent fermentation, and to render the adherence and growth of fungi almost impossible. From time immemorial it has been the practice, particularly in the country, to burn the ends of poles driven into the ground, to preserve them from decay. According to the sage remark of the celebrated Carlomb,

we should always take into serious consideration old and well known customs; but, in this instance, it is easy to admit the preserving effect of carbonization. In the first place, the surface of the timber is subjected to a considerable heat, the primary effect of which is to exhaust the sap of the epidermis, and to dry up the fermenting principles—here this is done by long exposure to the air; and in the second place, below the outside layer, completely carbonized, a scorched surface is found, that is to say, partly distilled and impregnated with the products of that distillation, which are creosoted and empyreumatic, the antiseptic properties of which are well known.

The author mentions instances of carbonized wood having been remarkably preserved for long periods under unfavorable circumstances, and observes that he was convinced by all these facts that the carbonisation of the timbers of ships would materially increase their durability; but that conviction was changed to certainty when he met with an article entitled "Seasoning of Timber," extracted from "The Architectural Navy," a work published in London in 1852. The writer, having noticed the numerous methods tried in the beginning of the 18th century to increase the durability of timber for building purposes, adds, that "not long after this time the method of heating or charring timber, before it was worked up, and also that of stoving, that is, of heating it in kilns with sand, was practised in the royal dockyards. The *Royal William*, one of the most remarkable instances of durability that the British navy has supplied, was built either wholly or in part of timber that had been charred."

The author asks why has this excellent method not only not been persevered in, but even abandoned? This is owing to many causes; the difficulty and danger of the means adopted for charring, when either straw, fern, or shavings are made use of; the serious objections of burning the timber too deeply; or the incumbrance of the apparatus, and the length of the time occupied, if sand kilns sufficiently heated are used; and, finally, to indifference, or that system of routine against which the wisest plans so often contend in vain.

The methods of carbonisation which the author first employed at Cherbourg, and which, by the order of the Minister of Marine, are about to be extended to all the dockyards of the French empire, are free from these objections, and realise, on the contrary, all the conditions to be desired, whether of simplicity, facility, safety, or economy. They are as follows:—

A gaspipe is brought into the dockyard. An india-rubber tube is screwed on, the other end of which, furnished with a joint, should be fixed at the side of the bench at which the men work. To this joint another end of a tube of sufficient length is fixed, and on that a little brass end is placed, similar to that of a fire-pump, but having inside a small pipe communicating with the reservoir of a foot bellows on the bench. The object of this bellows is, first, to mix with the gas the air necessary to obtain a complete combustion; and, in the second place, to impinge on the jet of flame such a force that it may be directed every way, and made to act not only on the surface of the wood, but in the holes, joints, bolts, mortices, &c., and in general on every part of the timber. The combustion takes place with the most perfect regularity, and, as can be proved, without the least danger, which, be it understood, does not exclude the precautions commonly prudent to adopt whenever fire is employed either on shipboard or in the dockyard.

The results obtained from experiments at the gasometer at Cherbourg, with the aid of a meter, and using a jet of average force, are—

- 1st.—That the consumption of gas would be about 200 litres per square metre, or 200 gallons per 10 square feet of carbonized surface.
- 2dly.—That a workman, in an average day's work of 10 hours, would carbonize a surface of 40 square metres, or 440 square feet.

3dly.—That one workman is sufficient for a bellows supplying two jets of gas.

It may therefore be admitted that, at full work, the expense would not exceed 15 centimes (1½d.) a square metre, or 10 square feet. Besides, as has been ascertained by experiment, the operation can be facilitated by smearing, in the first instance, the surface of the timber with a little tar. By so doing these other advantages are gained—

1st.—The carbonization of the cracks, that almost always occur on the surface of rough timber, is facilitated.

2dly.—It prevents the timber being affected too suddenly by the heat of the gas, which causes it to split.

3dly.—It prevents the cracking and splintering off of little ignited particles.

But beyond a mere facing of tar we must not go; a little thicker layer would impede, instead of furthering, the operation. Besides, we must stop as soon as the surface is freely carbonized, which shows that none of the parts below have escaped the charring—which is, I repeat, the end we seek. Under these circumstances, the depth carbonized will not exceed a third, or a fourth, of a millimetre. In ship-building, the carbonizing process ought to be applied to every surface in contact with, or, in general, intended to be surrounded by, moist and stagnant air.*

Moreover, it will be advantageously employed in the graving docks and slips, from the facility afforded in drying and hardening those parts of the hull intended to be preserved, and in destroying the fermentation which will be found there.

In house building, the process should be applied to the beams and joists embedded in the walls, or surrounded with plaster; to the joists of stables, cowhouses, wash-houses, &c.—which, although exposed to the free air, are constantly surrounded by a warm and moist atmosphere, an active cause of fermentation—to the wainscoting of ground floors; to the flooring beneath the parquet work, to the joints of tongues and rabbets, &c.; for carbonization by means of gas still leaves to the wood, for working purposes, all the sharpness of its edges.

By carbonization a practical and economical means is offered to railway companies of preserving, almost for ever, the sleepers, particularly oak, which cannot be impregnated by the injection of sulphate of copper. Let us suppose, for instance, that after, say 10 or 15 years, the sleepers on a line are taken up for the length of a mile, and replaced by new ones, the old when rasped and burnt again, will serve for the replacing of the following mile, and so on, one mile after the other.

With regard to vine-props and hop-poles, carbonization offers very great advantages in an economic point of view, by its cheap and practical method of operation.

As to the different methods of carbonization; when the timber-yard where the work is to be carried on is in the neighbourhood of a gas main, nothing can be easier than to lead it close to the work by a conducting tube, joining a little gasometer by which the issue is regulated.

If the expense of laying down the pipe is very heavy, compressed portable gas, like that distributed daily in Paris, as in many adjoining localities, can be used. The Imperial Marine adopt that plan, not only because their workshops are not lighted with gas, but, even if they had it, they prefer being able to carbonize certain parts of a vessel when afloat, for which it is sufficient to place on a boat or floating stage, moored alongside, a vessel charged with compressed gas; a regulator is put in communication with this, which allows the issue according to the pressure of the current of gas, or, in general, to such pressure as may be required.

In the place of coal gas, the cost of which is very

* Thus, as regards cased or cuirassed frigates, the external, as well as the internal surfaces of the planking, on which the iron plates are fixed, should be carbonized.

great, carbonic oxide gas may be advantageously employed; for, while on the one hand, its illuminating power is very weak, its heating power, on the other is very great.

Knowing the preservative effects of sulphur, the author was induced to try a species of paint, using flour of sulphur as a basis and linseed oil as an amalgamator.*

We know that when paint dries, to use a common expression, it is not by evaporation similar to that which water undergoes, but rather from the effect of a real combustion of the oil by the oxygen of the air, the result of which is a kind of solid resin, and it appeared to the author probable that the sulphur, having itself a great affinity for oxygen, would participate in that combustion from which would be generated sulphuric acid. These anticipations were fully realised. The planks painted for experiment emitted sulphurous vapours, and turned to red some strips of litmus paper previously moistened and subjected to the exhalations. Some logs of oak, painted in the same way, were buried in a dung-heap; six months afterwards the wood appeared perfectly intact, and exhaled a strong sulphurous odour, the action of which had, without doubt, prevented the formation of fungi.

It therefore appears proved that by smearing here and there either the surfaces of the length of the ribs or below the ceiling with this paint, a slightly sulphurous atmosphere will be developed in the hold, which will purify the air by destroying, at least in part, the sporules of the fungi.

This conclusion will be so much the more valuable, as it appears to be arrived at from the recent and curious experiments of M. Pastoreau, which, by depriving of air the sporules he had enclosed, annihilated their fermenting powers.

With regard to the carbonisation of timber, it may be stated that after having scraped the carbonised or charred layer, and pumiced the surface of the wood, in may be painted in the usual way, and with any colour.

ACCOMMODATION AND EXPENDITURE IN MECHANICS' AND SIMILAR INSTITUTIONS.

The following paper, by Mr. John Jones, Secretary to the South Staffordshire Educational Association, was prepared for the Educational Conference held at Dudley, on the 9th September last:—

Without proper accommodation for the various departments of an Institute, it is not likely to be very extensively patronized by the public; and if the income of a society is not expended with due regard to the interests of each department, the beneficial action of the Institute will greatly suffer. I propose in this paper to offer some remarks on both these heads.

Very few Institutions have exactly the kind of accommodation which is suited to their wants; some have too extensive premises, others are cramped in their operations by reason of inadequate room. Of course the accommodation at any particular Institute ought to be in proportion to the extent of its operations, and this is a matter which local circumstances must always more or less determine. It appears, however, quite possible that certain general principles may be laid down, whereby the managers of Institutions, large or small, may decide on the main features to be included in their work, and may also be able to estimate the cost and necessary premises for carrying on their work.

I consider that Institutions may be divided into two classes:—Those for villages and a rural, scattered population, and those for towns.

In the first case we have a population with little leisure, dotted over a large area, and possessing no good means of

getting from one part of the parish to another. For such places it seems desirable that a reading-room should be opened in the evenings, at some central spot, where the thickest population happens to be, but it might combine the ordinary features of a working men's club-room, where the members might read, converse, play at suitable games, or obtain refreshments. Any classes which could be carried on would be of an elementary character, and the proper place for them would be in the village school-room. Here also the lectures might be held, or, better still, regular lecture entertainments, consisting of short lectures combined with readings and music. It would be advisable to circulate the library in sections, each knot of houses willing to pay a few pence per quarter having one section at a time. A responsible person being appointed for changing the books at each house (say five or six), he would receive quarterly his section, and would leave two or three with each subscribing family, and, according to the number of houses, he would arrange the time for changing the volumes. A portion of the library might be kept at the reading-room for reference or for the use of the members frequenting the room. Such an Institute needs no more accommodation than a single room in some central cottage, with a tidy housekeeper, who would make the visitors comfortable and provide refreshments in a cosy way. In the majority of villages these arrangements would be found sufficient for all ordinary purposes. If the Institute (for which the name of a village club seems appropriate) could also undertake the management of a benefit society, horticultural show, garden allotments, &c., its operations would be more useful, and would be likely to have more general support.

In the second class of Institutions the conditions are more varied, and hence there is more difficulty in deducing some type which shall be generally applicable. My type of a town Institute consists of one or two reading-rooms, a library-room, a room for refreshment and conversation, one or more class-rooms, &c., and a large room (hall it may be called) for lectures, tea parties, and general purposes. In estimating the accommodation which any place may require, perhaps one-thirtieth of the population may be set down as available members for an Institute. Practically, the average is generally much lower: but there are towns where a much larger proportion than this belong to one or more Institutions, and there seems no reason to doubt that vigorous management will eventually exceed the standard I have named. Taking a town of 3,000 inhabitants as a starting point in the scale of comparison, we have to provide accommodation for 100 to 120 members. First, of the reading-room; one-third of the members will only attend occasionally, about one-sixth will attend during the day only, leaving one half who may be expected as more or less regular evening readers, between the hours of 6 and 10. Probably, then, not more than twelve to fifteen members will ever need to be accommodated in the reading-room at one time, so that 30 feet of available linear space at tables, reading stands, &c., will be ample provision. A small library-room would contain the books, and would also serve as a committee-room, secretary's office, &c. One class-room would be sufficient for this number of members, and would accommodate several classes meeting on different nights. All these rooms should be comfortably fitted up. The club-room for conversation and refreshments should be at least as large as the reading-room, but should be so furnished as to be applicable for various public purposes during the day, as it would only be open in the evenings for members. A lecture-hall, capable of seating 200 people, would be desirable. These arrangements would necessitate a graduated scale of payment. So much for reading-room, club-room or library separately, or a reduced fee for the collective advantages of the various departments, and the rate of payment ought of course to depend on the lowest working expenses of the society. For a town of twice the population, I estimate that the size of the various rooms above named would have to be increased one

* The paint is composed of:—

Flour of sulphur	... 200	grammes, 3,088 grs.
Common linseed oil	... 135	" 2,084 "
Prepared oil of manganese	30	" 463 "

half. With a population of eight or ten thousand, I am disposed to advocate two reading-rooms, first and second class, with payments accordingly, and it might be necessary to consider the advisability of having two club-rooms also. The class-rooms would have to be more numerous for this population, but a few good rooms would accommodate many classes if judiciously arranged.

As the main work of an Institute is carried on in the evening, the managers often are at considerable loss by their rooms being unoccupied during the day. There seems no reason why day schools of a superior character should not be carried on in Institute rooms, either under the control of the committee or by private enterprise. The managers at all events should endeavour to apply all their rooms to some paying purpose during the day.

For Institutions having a prospect of from one to three hundred members, an hotel or public house is the kind of building which appears the most easily adapted to the purposes of such a society. The rooms will be found conveniently arranged, so that each one shall be quite independent of any other. The tap-room becomes the reading-room; the parlour changes to a conversation and general room; the bar makes a good library and secretary's office, where books are handed out instead of beer; the large bed-room becomes committee-room, and other apartments form class-rooms or offices; the club-room at the back easily falls into a homely lecture-hall, school-room for day and evening pupils, &c., and there is ample accommodation for the person who has charge of the Institute.

Large towns require special buildings. A spacious hotel contains too many small rooms to be useful for Institute purposes; hence it appears advisable in such cases for the promoters of the town Institute to calculate what accommodation they will require, according to some such standard as that before mentioned, and then to erect a building sufficiently large to allow for any increase of population that may be expected; but not too large, or the Institute will be saddled with a heavy yearly expenditure for repairs, &c., which will be sure to detract from the usefulness of some of its departments.

In considering the expenditure of Institutions, I must lay down certain channels in which I would make the income of a society flow. One part must go for rent and attendance, another for newspapers and periodicals, another for classes, a fourth for fuel and gas, a fifth for printing and incidental expenses. I leave out lectures, because they ought to be made to pay their expenses, and any balance from them might be judiciously employed in arranging for some lecture treat from some eminent man or other. The library I also leave out, as an annual tea party, excursion, &c., would supply a fund which, instead of being applied in one sum to library purposes, might be spent in adding monthly the most important new works.

Having considered the working expenses of a society, the rates of subscription for ordinary and honorary members may easily be fixed, and I propose to deal with this income in the following way:—

We will suppose, for the sake of illustration, that the subscription of ordinary members has been fixed at 10s. a year, and that with the aid of honorary members this sum is raised to an average annual income per member of 12s. 6d. I would apportion $\frac{3}{4}$ th of this for rent, fuel, gas, and attendance: that is, the net cost of these items, after all sub-lettings of rooms, &c., have been deducted from the gross charges, should not exceed 5s. per member. One-fifth (2s. 6d. per member) I would allow for the reading-room, after deducting for the sale of old papers; the magazines would circulate for a time, and then be bound for the library; hence, if the number of members should fall off, certain papers must be discontinued; if it should increase, the members would have a direct benefit in the addition of other periodicals. One-tenth of the income I would allow for classes, after deducting the fees from expenses. One-fifth should be made to include

printing and advertising, and the other tenth would be for the incidental expenses of the society.

I suggest the above as an approximate standard which may be open to correction, and which the discussion on this paper may enable me to make. I offer it rather as pointing to what I consider the proper mode by which the managers of an Institution should lay out their money than as supplying a rule applicable to all circumstances. Were such general features as I have indicated to be adopted, the members of an Institute committee, though possibly many might be new to the kind of work required of them, would nevertheless have constantly before them a standard by which they could measure roughly whether each department of the society was having justice done to it.

No allusion has been made in this paper to many most desirable schemes which we hope, ere long, Institutions will more generally consider a part of their proper work, and which will have to be provided for out of their ordinary income; but I am anxious not to go beyond those operations which my experience suggests may be carried on by societies in this neighbourhood. My opinion is that we want to induce the managers of Institutions generally to set before them a definite work to do, and there will not be wanting those who are quite willing to do it. Some friends of education charge Institutions with frivolity and the lack of the practical element in their operations. By definitely marking out work to be done, by banding together for mutual assistance and experience, and by the managers meeting to confer together on matters connected with the well-being of their societies, we may hope that the beneficial operations of Mechanics' Institutions and kindred societies may be stimulated, till they take that place in the educational machinery of the country which they are calculated, and I hope destined, to occupy.

ARSENIC IN MANUFACTURES.

At an inquest recently held relating to the death of a young girl named Elizabeth Anne Abdela, Dr. Letheby read a report on the subject of arsenic used in the colouring of ladies' dresses, artificial fruits, flowers, &c. The following evidence was taken by Mr. John Humphreys, the coroner, presiding.

Elizabeth Abdela, of 15, Whitecross-place, Shoreditch, stated that she was the wife of James Abdela, who was assistant at a Turkish bath. The deceased girl was her daughter. The girl had some artificial grapes given to her by a little girl at about 9 o'clock on the evening of Sunday, the 28th ult., and was taken ill at about 11:15 p.m. the same night. Previously to her death the girl complained of pains in the abdomen. She died the following day at 1 o'clock. The witness saw her suck one of the grapes soon after they were given to her. It was green, and she sucked the entire of the green stuff off of it.

Elizabeth Hall, of Masham's-place, Whitecross-place, aged 13 years, stated that she was a companion to the deceased girl, and had given her the grapes spoken of by Mrs. Abdela. Witness worked for Mrs. Chappel, haberdasher, who lived at the corner of Clifton-street, and her mistress gave her the grapes, saying they were of no use to her.

Mr. Chandler, surgeon, stated that he was called to see the deceased girl at half-past 7 o'clock on the morning of the 29th ult. He saw her soon afterwards. She was then insensible, comatose, and she died in the course of the morning. Her symptoms were those of poisoning. He made a *post-mortem* examination of the body. The brain, chest, lungs, and heart were healthy. The anterior part of the stomach was perforated, and food had passed through the perforation. It was his opinion that the perforation had taken place within a short time before death; there were patches of inflammation the size of shillings and half-crowns close to the perforation. The other end of the stomach and intestines was healthy, as was also the kidney.

The patches of inflammation of the mucous membrane were due to some foreign irritant. They might have been produced by arsenical poison, though perforation from arsenic very seldom took place. He had been handed some of the grapes said to be in the deceased girl's possession, and he had got them analyzed. Some of them were green, and others blue; the former contained arsenite of copper, a deadly poison, and the latter cobalt, which was not poisonous in small doses. He did not think that one of the green grapes would have been sufficient to cause death.

At this stage of the inquiry the Coroner decided on adjourning, in order that an analysis might be made by Dr. Letheby.

When the Coroner and jury reassembled again,

Dr. Letheby was sworn, and read the following report as his evidence in the case:—"On Friday, October 3, I received from Edward Waller, the coroner's constable, the following things for examination:—1, a bottle containing the stomach of a child and a piece of intestine; 2, a bottle containing the heart of a child and a piece of liver with the gall bladder attached; 3, a bottle containing the gall bladder of a child; 4, a bottle containing a piece of lung and about half an ounce of blood; 5, a box containing green and blue and pinkish artificial grapes. All these were carefully examined with the following results:—1. The stomach was cut open and its contents were gone. The mucous coat was stained in several places of a dark reddish brown colour, as if from irritation. At the larger end of the stomach there was a chronic ulcer about one-third of an inch in diameter, which had pierced entirely through the walls of the stomach. The tissues of the stomach were examined for poison, but none was found. The piece of intestine was about 6in. in length. It was not opened, but its contents was secured by ligatures at each end. It contained about a teaspoonful of thick matter, highly tainted with bile. Search was made for solid particles of glass, &c., and the whole was examined for poison, but, as in the last case, without positive result. The contents of the second bottle were then examined. The heart was cut open and appeared to be free from disease. The gall bladder contained a large quantity of bile; this, with the piece of liver to which it was attached, was examined for poison, and distinct traces of arsenic were discovered. The contents of the third and fourth bottles were also tested. No poison was found. Lastly, the colouring matter of the artificial grapes and leaves was submitted to analysis. The blue and pink grapes were free from poison, but the green ones were covered with arsenical green (arsenite of copper). Ten of the grapes yielded three grains of the poisonous pigment; and I hand to the coroner a specimen of the metallic arsenic obtained from a single grape. The artificial leaves are also stained with arsenical green. Each leaf contains about a grain and a half of the poisonous pigment; and I hand in a specimen of the metallic arsenic obtained from a single leaf. The quantity of poison in one leaf is perhaps sufficient to kill a child. The result of this examination is that, although no trace of arsenic has been discovered in the tissues of the stomach and intestines, yet from the presence of a distinct trace in the bile and liver, it is evident that arsenic has been taken during life and absorbed into the system. Mr. Chandler, who attended the child, has given me an account of the symptoms, and they correspond exactly with what I have once seen as the narcotic effects of a small dose of arsenic. The giving way of the ulcer in the stomach might have been due to the irritation of the poison during life, or it might have been a *post-mortem* result; but I do not think from the symptoms described to me that it was the actual cause of the child's death. I attribute this rather to the poison. In the month of November, 1840, I was consulted in a case very similar to this, where a child died from the effects of arsenical green on the paper of the cupboard where its toys were kept. Two children were made ill by it, and one of them died. The case was the subject of an inquest. On that

occasion I ascertained that the paper contained nearly 13 grains of arsenical green in a piece of six inches square—a quantity sufficient to kill at least two persons. In many other instances I have found a like proportion of poisonous pigment upon such paper; and it is to be regretted that the dangerous use of such a pigment should continue to be practised. At the present time there are many arsenical greens going by the names of Scheele's green, Swedish green, Siskin green, Parrot green, Brunswick green, Newuid green, Mountain green, Schweinfurt green, Vienna green, Imperial green, Mittis green, &c., and they contain from 58 to 71 per cent. of arsenic, the pigment being in some cases reduced with chalk or plaster of Paris to lower the depth of the colour. These dangerous pigments are put upon paper, toys, artificial flowers, and even ladies' dresses. A wreath of 50 green leaves may contain poison enough to kill ten persons; and a green tarlatan dress of 20 yards would contain about 900 grains of white arsenic; and, considering how loosely the poison is attached, it is marvellous that very serious results do not often occur from it. It has been affirmed, by a Berlin physician, who has inquired into this matter, that a lady's dress might give off sixty grains of the poisonous pigment in the course of a single evening—scattering a dust of poison in the air of a ball-room. It is time that some measures should be adopted for the prevention of this practice. I think it right to say that there is a very easy means of discovering whether a green is poisonous or not. A drop of strong solution of ammonia put upon the colour will acquire a deep blue if copper is present, and copper is rarely present without arsenic.

The Coroner thought that the jury and the public ought to feel much obliged to Dr. Letheby for his scientific and interesting report. As corroborating what that report stated as to the poison which might be contained in a single dress, he might mention that a case had come within his own observation in which two sisters were taken ill after making a green dress for a lady, and the lady herself became ill after wearing it one night in a ball-room. Having heard Dr. Letheby's evidence, he apprehended the jury would have no difficulty in finding that the deceased girl had died from the effects of arsenite of copper contained in the colouring matter of the green grapes—one of which they had it in evidence she had sucked. The grape was composed of very thin glass, over which the colouring matter was spread.

The jury found "That the deceased, Elizabeth Anne Abdela, had been poisoned by sucking arsenite of copper from artificial grapes."

Home Correspondence.

COMPETITIVE EXAMINATIONS FOR THE PUBLIC SERVICE.

SIR,—As many members of the Society of Arts may not have read any reports of the discussion on the paper on Competitive Examinations, read at the meeting of the British Association, held at Cambridge, and which you have done me the honour to insert in the Society's *Journal*, I beg leave to state that we had the advantage of the attendance of a number of the members of the University, who have had great experience in conducting such examinations, and that the main proposition of the paper—that the topics of the subject matters for competition should be narrowed, but that the examinations in the topics selected should be made longer and deeper—was unanimously agreed to.

I gathered that the experience of the members of the University who have conducted middle-class examinations tends to the expediency of narrowing their range.

If it had been conformable to practice to put the chief propositions of the paper from the chair, as resolutions, I believe those who were present would concur with me in saying that they would have been carried, and that

there was a very gratifying expression of unanimity on the whole question by the examiners present.

I am, &c.,

EDWIN CHADWICK.

P.S.—I may notice one or two mistakes in printing—*paper* examinations, for *pass* examinations; of history being a field of *cram* and *developing*, instead of *dodging*.

Richmond, Surrey, Oct. 27, 1862.

Proceedings of Institutions.

BARNET INSTITUTE.—The thirteenth annual report states that the prosperity of the Barnett Institute continues unabated, and that great success has attended its operations during the year 1861–2; forty-five new members have been elected during the year. The state of the funds is highly satisfactory. Between Nov. 5th, 1861, and April 16th, 1862, twenty-one lectures were delivered, the whole of which were entirely gratuitous. The committee feel most thankful to those gentlemen who kindly afforded their services as lecturers, and they trust that the attention of their audiences, and the interest manifested in the subjects of the lectures, may induce them to repeat their good offices on future occasions. The library continues to be of a much more limited character than is desirable; the committee are, however, happy to state that in consequence of certain donations given specifically for the increase of the library, aided by a small addition from the general fund, they are enabled to devote £20 to the purchase of books. They hope, moreover, that as opportunities may arise, the friends and supporters of the Institute will kindly favour them with donations of books. One object of this Institution, which has not received hitherto the support to which it would appear to be entitled, is the formation of classes for instruction in various departments of knowledge. The committee regret that no classes have been in existence during the past year. They nevertheless earnestly request the attention of their members, particularly the youngest portion of them, to this feature of the Institute. Of the seven candidates who presented themselves before the Local Board in connection with this Institute, for the certificates of the Society of Arts, in April, 1861, five were successful. Four candidates have been examined this year. The great object of the Institute being to provide for its members the means of occupying, in a profitable manner, some portion of their leisure hours, the committee cannot but entertain the hope that, through the instrumentality of its library and reading room, its lectures, classes, and examinations for the certificates of the Society of Arts, it may be rendered, year by year, increasingly useful to the town and neighbourhood. They trust, moreover, that in bringing together, from time to time, persons occupying various positions in the social scale, it may tend to promote amongst them feelings of mutual respect and good will. The following lectures were delivered in the course of the season:—An Opening Address, by the President, C. T. Carter, Esq.; “The Teacher and the Taught,” the Right Hon. Lord Teynham; “Recollections of Switzerland” (illustrated with dissolving views), W. J. Haynes, Esq.; “History of Printing,” Rev. S. Davis; Charles Dickens’s “Cricket on the Hearth,” Mr. Baldock; “Some Men of Our Time,” E. W. Cox, Esq.; “The Voice of the Early Church,” Rev. C. Skrine; “The Highlands and Islands of Scotland,” C. A. Hanbury, Esq.; “Westward Ho!” F. E. Baines, Esq.; “Influence of the Mind on the Body,” J. C. Thorowgood, M.D.; “Scenes and Incidents of the First French Revolution, 1790,” Rev. C. R. Howell; “The Bar, the Pulpit, and the Senate,” D. Duthoit, Esq.; “Popular Superstition,” Rev. T. W. Sidebotham, B.A.; Readings in Poetry and Prose, Mr. Baldock; Grand Instrumental Concert, by Band of 2nd Royal Edmontown Rifle Militia, under Bandmaster Farren; “Martin Luther,” Major Wilbraham Taylor; “The Twilight World,” E.

W. Cox, Esq.; “The Electric Telegraph,” F. E. Baines Esq.; “St. Alban,” J. W. Earle, Esq.; “Lithography,” Rev. J. D. Bell; Grand Concert, by Mr. Frank Bodda’s Party; “Photography,” Mr. Samuels; “The United States of America, as they were and as they are,” G. E. Cottrell, Esq.; Second Instrumental Concert, by Band of Militia. The financial statement for the year ending April, 1862, shows that the receipts have been £84 9s. 1d., and the expenditure £70 4s. 5d., leaving a balance of £14 4s. 8d.; the total balance in hand, however, including the library fund, amounts to £31 1s. 2d.

GLASGOW INSTITUTION.—The Fourth Annual Report of the Glasgow Institution begins by giving a statistical table of the number of scholars and students who have attended it since it was founded, June 2, 1858:—

Year.	Total on the Rolls at the commencement of each year, ending May 10.	Total admitted from May 10 of the preceding year to May 10 of the given year.	Total who attended during the year ending May 10.
DAY CLASSES.			
1859.....	121	96	217
1860.....	127	75	202
1861.....	122	71	193
1862.....	106	133	239
1862 curt.	143	...	...
EVENING CLASSES.			
1859.....	72	298	370
1860.....	144	391	466
1861.....	215	598	669
1862.....	211	757	968
1862 curt.	238	...	...

Total number who attended within the year ending May 10, 1859, 587; 1860, 737; 1861, 1,006; 1862, 1,207. From the above table it thus appears that 1,207 distinct individuals have received instruction in the Institution during the year ending May 10, and that there were then on the roll 143 in the juvenile day classes, and 238 in the evening. Total for the summer season, 381. The number of tickets sold has been 2,090, exclusive of 317 on the rolls at the commencement of the season. The following are the numbers attending the various classes during the year. Of these about 200 attended more than one class. Mathematics, 35; geography and history, 8; drawing and perspective, 18; mechanical drawing and practical mechanics, 23; Latin, 105; Greek, 23; French, 111; German, 18; grammar, composition, and logic (English history as exercises), 166; writing, arithmetic, and book-keeping, 161; ladies’ classes for arithmetic, grammar and composition, &c., 17; phonography, 58; Gaelic, 7; music, 23; elocution, 121; mutual instruction, 25; juvenile day classes, 239; advanced juvenile, Latin, book-keeping, drawing, &c., 15; needle-work (day), 21; evening elementary classes for ladies—reading, writing, arithmetic, domestic economy, 73; evening elementary classes for boys and men, 64; morning elementary classes, writing, arithmetic, &c., 21; and dancing and deportment, 50. This year 46 candidates, implying 70 papers on 17 different branches, taught by 10 different masters, gave in their names for Society of Arts Examinations, and 21 for Local Board certificates only, being too young (below 16), or for branches not recognised by the Society of Arts, such as elocution, grammar, composition, &c. Of the former, 39 persons and 56 papers came forward to the Preliminary Examinations of the Local Board, of whom 36, implying 52 papers, were passed. Of the latter, 21 came forward and 16 were passed. Of the Society of Arts’ candidates, 29 came up to the Final Examinations, embracing 39 papers; 3 more who came late had to be rejected. Of the Local Board candidates, 13 came forward and 11 passed; 25 candidates and 34 papers were

passed, to whom 8 first-class certificates, 16 second, and 16 third were awarded. The Society of Arts' second prize for book-keeping was awarded to James M^cCallum Cherry, and the Board's first prize for grammar and composition to Robert M^cIlwraith. The following is an abstract of the pecuniary affairs of the Institution from May 15, 1861, to May 14, 1862:—

RECEIPTS:—

To class fees	£506 17 10
1st prize awarded to Local Board	10 0 0

Total £516 17 10

DISBURSEMENTS:—

By rents and taxes	£71 10 10
Coals, gas, cleaning	23 0 9
Advertising, printing, stationary	52 6 10
Subscription to the Society of Arts, and expense of Examination	6 8 4
Salaries to teachers	363 11 1

Total £516 17 10

On entering the premises now occupied by the Institution, at Whitsunday, 1861, a considerable sum had to be expended in repairs, a large portion of which is still owing. With the view of extending the membership, and with that, the interest in the Institution, at the stated general meeting of the members in April, the privilege of becoming members was extended to every individual paying five shillings annually, whether he or she be attending, or have scholars attending, the classes or not—formerly no others were admissible. On the 3rd of May last, by appointment of the Local Board—the authorised Inspectors of all the classes—the examination of the juvenile day classes was conducted by a committee, nominated for the purpose. Forty-eight candidates for Local Board certificates presented themselves, who were examined in reading, writing, spelling, grammar, and arithmetic. The result of the examination was, that 16 first-class certificates were awarded, 18 second, and 10 third; total passed, 44, and 1 added afterwards, 45. The pupils presented to Mr. Craig, the head master, a Family Bible, and to Miss Craig, an elegant Church one, accompanying the gifts with expressions of affection and attachment. The public Annual Examination of those classes took place on May 5. The Directors desire to thank those gentlemen who have given donations in aid of the Furnishing Fund, and trust that, if the present debt were once cleared away, they will not again need to appeal in a similar manner. They have also to thank the Local Board for the painstaking manner in which the various and somewhat onerous duties devolving on it have been discharged. Also, to thank the present teachers of the Institution for their indefatigable exertions and efficiency in conducting their respective classes; and, lastly, to congratulate the students and pupils on the success which has attended their earnest and well-directed studies.

MEETINGS FOR THE ENSUING WEEK.

- MON. ...Medical.** 8½. Dr. Thudichum, "On the Treatment of Dropsies, in connection with Diseases of the Kidneys, the Liver, and the Blood."
Geologists' Association, 7. Prof. Morris, "On the Plants of the Coal Measures."
WED. ...Geological. 8. 1. Prof. L. de Koninck, "On some Fossils from India," collected by Dr. J. Fleming. Communicated by Mr. T. Davidson. 2. Miss E. Hodgson, "On a Deposit containing Diatomaceæ, Leaves, &c., in the Iron Mines, near Ulverstone." Communicated by the President. 3. Capt. F. Applethorp, "On the Geology of a part of the Masulipatam District." Communicated by the President. 4. Mr. J. G. Sawkins, "On some Granitic Rocks in Jamaica."
THURS. ...Linnean. 8. 1. Mr. Albany Hancock, and the Rev. A. M. Norman, M.A., "On *Splanchnotrophus*, an undescribed Genus of Crustacea, parasitic on Nudibranchiate Mollusca." 2. Mr. A. Adams, Surg. R.N., "On the Species of *Pyramidellina*, found in Japan."
Chemical, 8. Mr. W. Doucer, "On Hypobromous Acid."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, October 17th, 1862.]

Dated 4th October, 1862.

2683. J. E. Billups, Halswell-terrace, Cardiff—Fixed points for railways.
2685. F. Parkinson, 114, Wood-street—Imp. in ladies' shawls and cloaks.
2686. F. Watkins, Smethwick, Stafford—Imp. in apparatus for milking cows.
2687. F. E. Blatspiel, Warwick-court—Imp. in diving apparatus and apparatus to be used for working in deep water. (A com.)
2690. F. Johnson, Great Charlotte-street, Landport, Portsmouth—Imp. in domestic fire escapes, and in receptacles for the same.
2691. W. Taylor and S. Buckley, Oldham—Imp. in machinery for preparing cotton and other fibrous materials.

Dated 6th October, 1862.

2692. R. Page, Great Yarmouth—Imp. in stables and stabling, applicable in part to kennels, and to the floors of fish houses.
2694. J. Bradbury, Fendleton, and W. Bradbury, Oldham, Lancashire—Certain imp. in carding engines.
2695. D. Lowe, Aston, near Birmingham—Imp. in the manufacture of door bolts and latches.
2696. S. Holland, Oldbury, Worcestershire—Imp. in machinery for the manufacture of bricks, drain, sanitary, and other pipes, tiles, quarries, and other articles of like manufacture, made from clay, marl, and other plastic substances.
2697. W. Clark, 53, Chancery-lane—Imp. in articles of clothing. (A com.)
2698. J. Newnam, Crayford, Kent—Imp. in apparatus for crystallizing and for evaporating.
2699. T. Beards, Stowe, Buckinghamshire—Imp. in machinery for cultivating land.
2700. S. F. Cox, Bristol—Imp. in washing and tanning hides and skins.
2701. A. V. Newton, 66, Chancery-lane—An improved apparatus for drying grain. (A com.)
2702. C. Chincock, Queen's-road-west, Regent's-park—Imp. in the construction of axle boxes.

Dated 7th October, 1862.

2703. J. Heap, Ashton-under-Lyne—Imp. in screw stocks and dies.
2704. J. Smith, Egdon, near Worcester—An improved screw linchpin for carriages and agricultural implements.
2705. W. Aston, Birmingham—Certain imp. in the manufacture of buttons for ladies' and gentlemen's wear.
2706. J. Oxley, Frome—Imp. in apparatus for expressing and separating beer from yeast or barm.
2707. F. Rahles, Albert-street, Middlesex—An improved safety envelope.
2708. A. Forbes, Canal-terrace, Aberdeen—Imp. in connecting together parts of vessels formed of tin plate, and in the means or apparatus employed therein.
2709. J. D. Welch and A. P. Welch, Gutter-lane—Imp. in machinery for blocking and pressing hats and bonnets.
2710. H. D. P. Cunningham, Bury-house, near Gosport—Imp. in working the guns and in performing other necessary work on board ships, and in apparatus employed therein.
2713. A. V. Newton, 66, Chancery-lane—Imp. in the construction of condensers or coolers. (A com.)

[From Gazette, October 24th, 1862.]

Dated 15th July, 1862.

2035. T. G. Ghislin, Hatton-garden—Imp. in the treatment or preparation of British and foreign alge, and the application of the same to various branches of the arts and manufactures.

Dated 22nd July, 1862.

2080. A. Fournier, 13, Maddox-street, Middlesex—Imp. in the manufacture of easy chairs, seats for railway and other carriages, and other kinds of seats and mattresses.

Dated 30th July, 1862.

2167. W. Norman, Manchester—Imp. in tables and drawers, or other sliding receptacles.

Dated 1st August, 1862.

2186. W. E. Newton, 66, Chancery-lane—Imp. in projectiles for ordnance and small arms, and in the wads or sabots to be used therewith. (A com.)

Dated 8th August, 1862.

2220. J. Siron, Castellsarrazin, France—A new medicinal preparation for internal and external application.

Dated 16th August, 1862.

2311. S. A. Bell, Epping-villas, Stratford, and T. Higgins, Carriac-terrace, Bow—Improved apparatus for dipping lucifer matches.

Dated 6th September, 1862.

2467. W. A. Richards, Chester-cottage, Cornwall-place, Holloway—An improved fastening for purses, pocket books, bags, cigar cases, books, wearing apparel, jewellery, and other articles.

Dated 16th September, 1862.

2542. W. Clark, 53, Chancery-lane—Imp. in the treatment of peat and peat tar for the production or manufacture of various products, and in the apparatus for the same. (A com.)

Dated 19th September, 1862.

2571. J. B. Giertz, Great St. Helens—Imp. in gas burners or jets.
2574. J. Imray, Bridge-road, Lambeth—Imp. in apparatus for telegraphing and signalling by means of electricity. (A com.)

Dated 23rd September, 1862.

2591. J. Mapple, 2, Newman's-place, Kentish-town, and D. Mapple, 3, Queen's-road, Homerton New-town—Imp. in telegraphic apparatus.

Dated 27th September, 1862.

2634. M. Henry, 84, Fleet-street—Certain new and improved applications of petroleum and its products, certain agents produced by combining the same with other substances, and certain modes of treating caoutchouc, gutta percha, and their compounds, and substances similar thereto. (A com.)

Dated 30th September, 1862.

2654. A. Prince, 4, Trafalgar-square, Charing-cross—Imp. in the manufacture of varnish, printing ink, paint, and printing colours. (A com.)

Dated 1st October, 1862.

2660. E. Lord, Rawtenstall, Lancashire—An imp. in power looms for weaving.

Dated 2nd October, 1862.

2663. W. H. Ward, 59, Packington-street—Imp. in night, day, and fog signals, and the means for effecting the same.

Dated 3rd October, 1862.

2672. W. Clark, 53, Chancery-lane—Improved atmospheric toy pistols and guns. (A com.)

Dated 4th October, 1862.

2684. J. M. Cabirol, 17, Rue du Faubourg Montmartre, Paris—A new or improved submarine lamp.

2688. W. Clark, 53, Chancery-lane—Imp. in the means of preserving goods from fire, and in apparatus for the same. (A com.)

Dated 6th October, 1862.

2693. T. Keech, New York—Imp. in floating batteries. (A com.)

Dated 7th October, 1862.

2711. J. K. Hampshire, Whittington, Derbyshire—Imp. in apparatus or machinery for washing coal, coal slack, and other mineral substances, and separating foreign particles therefrom.

2712. J. Beale, Hope-street, Maidstone, and M. A. Beale, Upper Brunswick-terrace, Barnsbury—Imp. in the preparation or manufacture of manure.

Dated 8th October, 1862.

2714. C. F. Terry, Sheffield—Imp. in machinery for propelling vessels.

2715. D. Nickols, Manchester—Imp. in machinery or apparatus for measuring and registering lace and other similar articles.

2716. W. C. Burden, Leicester—Imp. in mechanism for giving the pitch or tone required in tuning musical instruments, and also the key note of vocal music.

2717. T. Ratcliffe, Colne, Lancashire—Certain imp. in looms for weaving.

2718. P. Clavel, Paris—Imp. in the treatment of violet colours derived from coal tar oils.

2719. J. R. Harris, Goldington-crescent, St. Pancras-road—Imp. in propelling vessels.

Dated 9th October, 1862.

2721. H. Dullens, 13, Little Britain—An improved runner and fastening for umbrellas, parasols, sun shades, and other like articles.

2722. J. Maurice, 3, Langham-place, Regent-street—Imp. in steering ships or vessels, and in the apparatus to be employed for that purpose.

2723. W. Bush, Tower-hill—Imp. in cannon and small arms.

2724. C. N. Wilson, Batley Carr, near Dewsbury, Yorkshire—Imp. in rag machines.

2726. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the manufacture of paints or pigments. (A com.)

2727. R. Hammond, 4, Trafalgar-square, Charing-cross—Imp. in armour for ships of war.

2728. A. V. Newton, 66, Chancery-lane—Improved machinery for breaking and cleaning flax, hemp, and other like fibrous substances. (A com.)

2729. J. B. Falser, Crown Hotel, Holborn—Improved apparatus for manufacturing paper pulp, and recovering the alkali used in such manufacture.

2730. G. Simons, 27, Place du Théâtre, Liege, Belgium—Imp. in the manufacture of plates, rods, axles, tyres, and other articles that are required to be partly of iron and partly of steel.

Dated 10th October, 1862.

2731. L. Hosch, 9, Laurence Pountney-hill, Cannon-street—An imp. in the mode of constructing travelling trunks and portmanteaus.

2732. W. Schofield and S. Schofield, Ashton-under-Lyne—Imp. in apparatus for cutting button holes and other similar purposes.

2733. R. E. Green and J. Cockcroft, Accrington, Lancashire—An improved amalgamation of materials forming a substance suitable for printers' blankets, conductors used in paper making, packings for joints, and similar purposes.

2734. G. Baguley, Hanley, and H. Greener, Sunderland—An improved construction of insulator for telegraph wires.

2735. J. Lowe, Claremont-place, Old Kent-road, and J. Harris, Ess-hill-house, Newton Abbot, Devonshire—An improved construction of propeller.

2736. H. A. Marinoni, Rue de Vaugirard, Paris—Imp. in apparatus for fixing type in the chases.

2737. W. C. Edge, Clerkenwell—Imp. in velocipedes.

2738. D. S. Sutherland, Rio de Janeiro—Imp. in constructing beams, girders, bridges, and viaducts.

2739. W. Weallens, Newcastle-upon-Tyne—Imp. in surface condensers for marine and other engines.

2740. T. Anderson, Glasgow—Imp. in the construction of ships vessels.

Dated 11th October, 1862.

2741. J. J. Shedlock, 63, Cambridge-street, Pimlico—Imp. in gas-meters.

2742. E. J. Franklin, Birmingham—A combined spring tape measure, needle case, and pin cushion.

2743. A. Vennedy, Swan Yard, Shoreditch—An improved composition for covering and forming the tips of umbrellas and parasols, also applicable to covering the ribs and stretchers of same.

2744. R. A. Brooman, 166, Fleet-street—Imp. in breech-loading fire arms. (A com.)

2745. W. Catchpool, 355, Goswell-road—Imp. in fire escapes.

2746. J. Durant, 3, Stangate-street, Westminster—Imp. in the form and construction of chimney tops or appliances for surmounting chimneys.

PATENTS SEALED.

[*From Gazette, October 24th, 1862.*]

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| <i>October 24th.</i> | 1269. G. Davies. |
| 1210. R. C. Mansell. | 1271. J. Maiden. |
| 1211. P. R. Drummond. | 1277. J. M. Carter. |
| 1214. J. Elder. | 1278. A. Prince. |
| 1216. J. Aspinall. | 1279. W. Staufen. |
| 1220. W. Hale. | 1280. J. L. Norton. |
| 1221. W. Fiskien. | 1281. J. M. Napier. |
| 1222. L. McLachlan. | 1284. H. Willis. |
| 1226. T. U. Brocklehurst. | 1286. W. T. Loy. |
| 1234. H. W. Hart. | 1293. W. Bodden and W. Mercer. |
| 1237. A. Lester. | 1318. J. Fowler. |
| 1243. R. Vaile. | 1322. C. Schlickeysen. |
| 1246. H. F. Wells. | 1328. H. Allman. |
| 1250. S. W. Newington. | 1339. E. B. Wilson. |
| 1251. E. Clark. | 1354. W. Clark. |
| 1252. W. Clark. | 1362. T. H. Hopwood. |
| 1253. J. Ross. | 1376. W. Riddle. |
| 1256. W. L. Tizard. | 1431. T. Buckney. |
| 1257. D. M. Childs. | 1519. M. A. F. Mennons. |
| 1258. D. M. Childs. | 1894. M. A. F. Mennons. |
| 1259. D. M. Childs. | 1971. J. M. Gille. |
| 1260. E. B. Wilson. | 2006. M. A. F. Mennons. |
| 1264. E. Moore. | 2105. T. Lemaistre. |
| 1265. A. Travis and B. Travis. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[*From Gazette, October 28th, 1862.*]

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| <i>October 20th.</i> | <i>October 23rd.</i> |
| 2410. G. T. Bousfield. | 2450. J. Armour. |
| 2416. W. Fox and J. Willis. | <i>October 24th.</i> |
| 2417. R. A. Brooman. | 2474. C. Stannet. |
| 2594. T. D. Perkin. | 2477. J. A. Turner. |
| <i>October 21st.</i> | <i>October 25th.</i> |
| 2460. H. Phillips and J. Bannehr. | 2458. P. R. Hodge. |
| <i>October 22nd.</i> | 2461. R. A. Brooman. |
| 2413. J. Avery. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[*From Gazette, October 28th, 1862.*]

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|----------------------|------------------------------------|
| <i>October 20th.</i> | 2392. T. B. Sharp and R. Furnival. |
| 2359. A. Parkes. | <i>October 24th.</i> |
| <i>October 22nd.</i> | 2404. J. Hands. |
| 2466. W. Gardner. | <i>October 25th.</i> |
| <i>October 23rd.</i> | 2399. S. O'Regan. |
| 2377. J. Rives. | |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4517	Oct. 25	Gas Singeing Lamp	{ Birtles and Gottwaltz, and Thomas W. Osborne }	Birmingham.
4518	,, 27	Duplex Crochet Needle and Cap	John Shrimpton and Son ...	Shedley.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 7, 1862.

NOTICE TO MEMBERS.

The One-Hundred-and-Ninth Session of the Society will commence on Wednesday, the 19th November, at 8 o'clock, when Sir THOMAS PHILLIPS, F.G.S., Chairman of the Council, will deliver the Opening Address. The Chair will be taken at Eight o'clock on the following Wednesday Evenings:—

1862. November	—	—	19	26	
„ December	3	10	17	—	—
1863. January	—	14	21	28	
„ February	4	11	18	25	
„ March	4	11	18	25	
„ April	—	8	15	22	29
„ May	6	13	20	27	
„ June	—	—	—	24*	

For the Meetings previous to Christmas, the following arrangements have been made:—

- NOVEMBER 19.—Opening Address by Sir THOMAS PHILLIPS, F.G.S., Chairman of the Council.
- * * * On this evening the Medals which were awarded by the Council for Papers read at the Weekly Evening Meetings during the last Session, will be distributed.
- NOVEMBER 26.—“ On the Utilization of Peat, with reference more particularly to the Manufacture of Hydro-Carbon Oils.” By B. H. PAUL, Ph.D.
- DECEMBER 3.—“ On Thompson’s Process of Boatbuilding by Machinery.” By D. PUSELEY. Illustrated by Models.
- DECEMBER 10.—“ On the Construction of Labourers’ Cottages and Sanitary Building Appliances.” By JOHN TAYLOR, Jun., Architect. On this evening General Tremenhoe will preside.
- DECEMBER 17.—“ On the Mines and Minerals of the United Kingdom.” By ROBERT HUNT, F.R.S., Keeper of Mining Records, Government School of Mines.

GENERAL INDEX.

A general Index to the first ten volumes of the *Journal* will shortly be published, which should be bound with the present volume. Members who desire to have copies are requested to apply to the Secretary before the 1st of December, in order that a sufficient number may be printed.

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

NOTICE TO INSTITUTIONS.

A limited number of copies of a pamphlet, by Mr. Henry Roberts, F.R.I.B.A., “ On the Essentials of a Healthy Dwelling, and the Extension of its Benefits to the Labouring Population, with a Special Reference to the Promotion of that Object by H.R.H. the late Prince Consort,” has been placed at the disposal of the Council for distribution amongst the Institutions in Union. Any Institution desiring to have a copy should apply to the Secretary.

INTERNATIONAL EXHIBITION OF 1862.

REPORTS OF THE JURIES.

The Council of the Society of Arts have felt the importance of having some permanent and authoritative Record of the International Exhibition, and finding that Her Majesty’s Commissioners have provided only for the publication of the awards of the Juries, but not of their Reports descriptive of the Progress of Industry since the Exhibition of 1851, the Council have undertaken this work, with the co-operation of Her Majesty’s Commissioners and of the Juries, and have placed the matter in charge of Dr. Lyon Playfair, the Special Commissioner of the Juries. The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s. ; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

Forms of application for copies have been issued to Members of the Society, to Jurors, and to Guarantors. It was the intention of the Council to issue the volume complete in the early part of September, but as several of the Reports have not yet been received by Her Majesty’s Commissioners, the completion of the entire work has been unexpectedly delayed; the Council, however, unwilling to defer the publication of the Reports already completed, have issued to the subscribers those that have been received up to the present time. When all the Reports are delivered, the parts now issued to subscribers will be exchanged, if uninjured, for the perfect volume, bound or unbound, as desired. Individual reports are sold separately; for prices see advertisement.

INTERNATIONAL EXHIBITION OF 1862.—VISITS OF SCHOOLS.

The following is a continuation of the Schools reported to Her Majesty’s Commissioners as having entered the Building from the 27th of October to November 1st:—

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
Oct. 27	Brixton-hill	St. Ann’s Asylum	Subscription	7	
„ „	Red-hill, Surrey ...	Private	W. Rowney, Esq.	17	
„ „	Stone Dartford, Kent.	National	Rev. F. Murray	29	

RETURN OF SCHOOLS (*Continued*).

DATE.	FROM WHAT LOCALITY.	NAME OF SCHOOL.	BY WHOM SENT.	No. of Children from each School.	Total each day.
" "	East Tytherly, Hants.	Endowed	Sir Christ. Rawlins	14	
" "	Leeds... ..	Wortley	Rev. J. Pettitt	25	
" "	Coventry	Black Gift... ..	The Trustees	56	
" "	Shepherd's Bush	British	Own Expense	10	
" "	Bayswater	Kensington-park College	W. A. Davy (Principal)	26	—184
" 28	Horsleydown	St. John's	{ Rev. H. Vachel and Rev. S. Rolson ... }	54	
" "	Southwark... ..	St. George's Catholic Cathedral	Rev. W. Donell	25	
" "	Wandsworth	Manor House	Own Expense	24	
" "	Westminster	St. Margaret's	Subscription	42	
" "	Duncton, Sussex	Burton	T. Fairbairn, Esq.	40	
" "	Duncton, Sussex	Catholic	T. Fairbairn, Esq.	30	
" "	Dalton	All Saints' Choir	Rev. A. M. Myers	12	
" "	Bedford Chapel	Sunday	George Knox, Esq.	26	—253
" 29	Marylebone	National	Rev. C. J. Eyre	47	
" "	Carshalton	National... ..	Subscription	94	
" "	Streatham-hill, Surrey	Royal St. Ann's	Committee	12	
" "	Sydenham, Kent	Perry-hill House	Mrs. Todd	14	
" "	Hoxton	Ragged	Lady Charlotte Sturt	20	
" "	Rickmansworth	Private	Rev. F. Henson	10	
" "	Tuffnell-park West... ..	St. John's Collegiate	Dr. Sherrin	16	—213
" 30	Surrey	Outlands	J. G. Sheppard	34	
" "	Stepney	St. Philip's National	J. B. Walmisly	130	
" "	Croydon	St. Andrew's Middle	Rev. J. Fitzwygram	15	
" "	Sloane-street	Hans Town	Subscription	6	
" "	St. Pancras	Industrial	Mr. W. Weeks	20	—205
" 31	Acton	Private	Miss E. Robinson	14	—14
Nov. 1	Westbourne-terrace	Private	Miss Millman	18	—18

VISITS OF WORKMEN.

The following is a continuation of the return of the number of workmen, mechanics, operatives, and others who have visited the building from the 27th to the 30th of October:—

DATE.	DESCRIPTION OF PERSONS.	FROM WHAT LOCALITY.	BY WHOM SENT.	NUMBER.
Oct. 27	48th Middlesex Rifles	Lincoln's Inn-Fields	Captain McDonald	18
" "	Tobacco Manufacturers' Workmen	Bartholomew-close	Messrs. Crofton and Rippon	63
" "	Iron and Rag Merchants' Workmen	Bethnal-green	Mr. W. Ward	43
" "	Heywood Amateur Brass Band	Heywood, near Manchester	Heywood Relief Company	14
" "	Brewers' Workmen... ..	Banbury	Banbury Brewing Company	12
" "	Bell Founders	Whitechapel-road	Messrs. George Mears and Co.	15
" "	Furriers	Davies-street, Berkeley-sq.	Mr. Lillierap	9
" "	{ Marines and Boys from H. M. Ship "Pembroke" }	Sheerness	Subscription	16
" "	Builders' Workmen... ..	St. John's-wood	— Spencer, Esq.	18
" "	Brushmakers	Lisle-street, Soho	Coate and Co.	15
" 28	Ticket Examiners	Great Eastern Railway	G. Fearn, Esq.	26
" "	Farm Labourers..	Wilton, Wilts	{ Messrs. Rawlance, Taber, Woodcock, Ford, Mayo, Flower, and Bennett }	480
" "	Shoe Black Brigade	Notting-hill	J. Erek, Esq.	26
" "	Police... ..	Hull	Watch Committee	28
" "	18th Hussars	Aldershot	Cornet Yeldham	17
" "	{ Choir Boys of the 2nd Batta. Grenadier Guards... .. }	Wellington Barracks	Captain T. Smith	11
" 29	{ London Warehousemen employed by Aire & Calder Glass Bottle Company }	King William-street, City, and Ratcliffe }	Messrs. Breffitt and Co.	34
" "	Patent Shutter Makers	Gate-street, Lincoln's-Inn	Messrs. Clark and Co.	63
" "	Builders	Lower Clapton... ..	Skinner's Brothers	25
" "	Agricultural Labourers	Sawbridgeworth, Herts	Mr. Prout	54
" "	Workmen at Alum Works	Bow Common-lane	A. A. Croll, Esq.	50
" 30	Inmates of Workhouse	Hampstead	Subscription	31
" "	{ 23rd Company of the Royal Marine Artillery }	Portsmouth	Captain Gladstone	31
" "	Workmen at Alum Works	Bow Common-lane	A. A. Croll, Esq.	50
" "	Agricultural Labourers	Great Wigborough, Essex	Subscription	15
" "	Scots Fusilier Guards	Wellington Barracks	The Officers	50
" "	Naturalists' Artists and Assistants	Vere-street, Oxford-street	Messrs. Ward	10
" "	Shilling Clock Makers	Oxford-street	Messrs. Preece and Co.	20
Total				1,244

THE PRODUCTIONS OF HUNGARY AT THE INTERNATIONAL EXHIBITION.

By LADISLAS KORIZMICS, VICE-PRESIDENT OF THE HUNGARIAN EXHIBITION-COMMITTEE, PEST.

According to statistical accounts the yearly produce of Hungary, is of—

Wheat	...	14,655,000	Vienna Metzen.*
Rye	...	15,321,000	" "
Maize	...	14,506,000	" "
Barley	...	15,950,000	" "
Oats	...	24,909,000	" "
Other kinds of cereals	...	1,425,000	" "
Peas, Beans, Lentils	...	1,860,000	" "

The agricultural products, which are especially fit for exportation, are—

- Wheat and the flour made from it.
- Rape, and Rape-oil.
- Tobacco.
- Wine.
- Wool.
- Timber.
- Hemp.

WHEAT.

Although the whole quantity of the wheat grown in Hungary (nearly 15,000,000 V. M.) is of good quality, still the wheat grown in the Banat, in the counties of Bács and Fehér, and in the plains adjacent to the river Theiss, is considered the best.

The staple places for the corn trade, are Pest, Mosony, (Wiselburg), Győr (Raab), Törökbecse, Szeged, Nagy, Kanizsa.

Of these places, Pest being the most important market, the prices there may be regarded as the general average. These prices were

in the year 1824	...	1 florin 21 kreuzers.†
" 1836-1845	...	1 " 82 "
" 1851	...	2 " 86 "
" 1854-1861	...	4 " 37 "
" 1862 (August)	...	4 " 70 "

To Pest, comes the corn by railways, and on the Danube; from where it is conveyed to Vienna by the railway on the left bank of the Danube, or more generally by steam and common boats.

From Pest, and that part of Hungary situated on the right side of the river, corn is sent to Trieste by railway. On this line the freightage for a cwt. of wheat is now from Buda to Trieste, 80 kreuzers.

FLOUR.

Of the Hungarian wheat a superior flour and grit is made, and of the barley groat of a very good quality is produced in large steam-mills, of which the most important are at Pest and Buda, though some very considerable establishments are also to be met with throughout the country.

The following are, besides others, represented at the International Exhibition:—

1. The Cylinder-mill Association at Pest. (Prize Medal.)

A. Table grit, coarse	...	15 florins 20 kreuzers the cwt.‡
B. " fine	...	15 " 20 "
No. 0. King's flour	...	14 " 20 "
1. Chandler extract	13	" 20 "
2. Baker extract	12	" — "
3. Flour for rolls, best	10	" 30 "
4. Flour for rolls	8	" 60 "
5. Bread flour, best	7	" 60 "
6. Bread flour	6	" 30 "

The above sorts are sold in sacks of 150 lbs. Each sack costs 1 florin Austrian currency.

2. Barber and Kluseman at Buda. (Prize Medal.)

A. Table grit, coarse	...	15 florins 50 kreuzers the cwt.
B. " fine	...	15 " — "
No. 0. King's flour	...	14 " — "
1. Chandler extract	13	" — "
2. Baker extract	12	" 20 "
3. Flour for rolls, best	10	" 30 "
4. Flour for rolls	8	" 60 "
5. Bread flour, white	7	" 60 "
6. " black	6	" — "

They are sold in sacks of 150 lbs. Each sack costs one florin.

3. John Blum, at Buda. (Prize Medal.)

A. Table grit, coarse	...	15 florins 20 kreuzers the cwt.
B. " fine	...	15 " 20 "
No. 0. King's flour	...	14 " 20 "
1. Chandler's extract	13	" 20 "
2. Baker extract	12	" — "
3. Flour for rolls, best	10	" 30 "
4. Flour for rolls	8	" 70 "
5. Bread flour, white	7	" 50 "
6. " black	6	" 50 "
I. Rye extract...	8	" 50 "
II. Rye flour for rolls	7	" 50 "

The above sorts are sold in sacks weighing 150 lbs. as far as No. 6. Each sack costs one florin Austrian currency.

4. Werther, F., at Buda. (Prize Medal.)

No. 0. Barley groats, coarse	8 florins 50 kreuzers the cwt.
1. " fine	9 " — "
2. " " 11	" — "
3. " " 13	" — "
4. " " 15	" — "
5. " " 17	" — "
6. " " 19	" — "
7. " " 21	" — "
8. " " 23	" — "
9. " Pearl groats fine	26 " — "
10. " " finest	30 " — "

Sold in sacks weighing 100 lbs. Each sack costs one florin.

5. Stephen-mill Company at Debreczin. (Prize Medal.)

A. Table grit, coarse ...	15	florins 20	kreuzers the cwt.
B. „ fine ...	15	„ 20	„
C. „ middle ...	13	„ 40	„
No. 0. King's flour ...	14	„ 20	„
1. Chandler extract	13	„ 20	„
2. Baker extract ...	12	„ 20	„
3. Flour for rolls ...	10	„ 40	„
4. Bread flour, white, first quality	8	„ 20	„
5. „ second quality	7	„ —	„
6. „ brown	5	„ 40	„
K L. Half corn* (Kétszeres)	6	„ 70	„
R L. Rye flour, first quality	8	„ —	„
R L. „ second „	5	„ 60	„
A K. Barley groats 00	15	„ —	„
„ „ 0	14	„ —	„
„ „ 1	12	„ —	„
„ „ 2	10	„ —	„
„ „ 3	8	„ —	„
„ „ 4	7	„ —	„

For each sack is paid 1 florin 5 kreuzers.

6. Traytler, L. A., at Arad. (Honourable mention.)

A. Table grit, first quality	13 florins — kreuzers the cwt.
B. " second	13 " — "
No. 0. Finest extract	12 " — "
1. Chandler's extract	10 " 80 "
2. Baker extract	9 " — "

* A mixture of wheat and rye, cultivated and reaped simultaneously.

* 1 Metzen = 1.691 bushel.

† 1 florin = 100 kreuzers, about 2 shillings.

‡ 1 English ton = 18 ¹/₁₀ Vienna cwt.

3. Flour, finest ...	7	60	„
4. Flour for rolls ...	7	—	„
5. Flour for bread, white	6	20	„
6. „ black	5	60	„

Sold in sacks weighing 150 lbs. Each sack costs one florin.

The flour is carried by the Southern Railway to Trieste, for 1 florin 20 kreuzers per cwt., or for 1 florin 3 kreuzers if for export, which must be made known to the railway directors.

RAPE.

The rape or colza is chiefly cultivated on the extensive plains in the counties of Bács, Torontál, Csongrád, Békés, Csanád, Arad, Pest-Solt, Heves-Szolnok, and on the right bank of the Danube in the counties of Fehér, Tolna and Baranya.

The annual crops much depend on meteorological conditions and therefore vary. In the year 1861, the total produce amounted to about 1,000,000 Vienna metzens, while in 1862, it was scarcely one quarter of that quantity.

The price of the metzen was, 1861, 7½ florins; in 1862, 8½ florins. Six florins can be taken as the average.

The central trading staple for rape is Pest.

The greater part of the rape grown in Hungary is exported as rape seed; though there are some establishments where it is pressed for obtaining oil. One of the most important mills is close to Pest, at Rákoss-Palota, belonging to the firm Schossberger S. W. and Sons. There are worked up about 160,000 Vienna metzens annually, which yield about 40,000 Vienna cwt. of oil, and 80,000 cwt. of rapeseed cakes (oil-cakes), which are exported in great quantities to England.

The price of these articles are, for 1862:—

a. Double refined oil, the Vienna cwt., cask included, 36 florins. In other years about 27 florins.

b. Raw rape oil (Rohes rüböl), 35 florins. In other years, 25 to 26 florins.

c. Machine oil (Maschinen Schmieröl), extensively used instead of the olive oil for oiling machines, 38 florins.

d. Rapeseed cakes, the common food having failed this year, 2½ florins; but in other years about 1½ florins the Austrian cwt.

Linseed cakes are also produced, and considerable quantities exported. The cwt. 4 florins.

TOBACCO.

The cultivation of the tobacco plant in Hungary is considerable. Although the manufacture and trade of snuff, tobacco, and cigars is a State monopoly, permission to grow tobacco can be obtained of the authorities, as well as license for its export, hence this favourite occupation of the Magyar is continually on the increase.

For the State purposes a license is given annually for the cultivation of an area of about 75—100,000 yokes (one Hungarian yoke, 1.06 acre), in addition to which is granted a certain area for growing tobacco for export. In the present year the area of tobacco-planting for export amounted to about 8,000 yokes. The chief district for tobacco is situated on the left bank of the Theiss.

The quantity raised on the area reserved for the State manufactures amounts annually to about 750,000 cwt., and on that for export about 80,000 Vienna cwt.; were an impetus given by a greater demand, the production could be doubled or trebled.

The following are the prices fixed by the state factories for the tobacco needed for their own purposes, for the years 1862, 1863, and 1864:—

A. Common leaves.

1. From Debreczen, Szamosbát, Szullok, Nagy-Károly, Szeged, Theiss, mosaicel and common garden-grown tobacco, the Austria cwt. without the stalk (Storren).

Selected leaves...	11 florins	
I quality...	8 „	50 kreuzers.
II „	6 „	50 „
III „	4 „	

2. From Nagy-Károly and Szullok, with the stalk.		
I quality...	7 florins,	50 kreuzers.
II „	5 „	50 „
III „	3 „	45 „

3. From Pécs (Fünfkirchen) Leaf (with the stalk).

I quality...	6 florins,	50 kreuzers.
II „	5 „	
III „	2 „	75 „

4. From Pécs, stemmed.

Selected leaves...	10 florins.	
I quality...	7 „	50 kreuzers.
II „	6 „	—
III „	3 „	50 „

5. From Cserbely, leaf.

I quality...	7 florins,	30 kreuzers.
II „	5 „	25 „
III „	3 „	50 „

6. Cigar covers, all kinds, stemmed.

I quality...	21 florins	
II „	18 „	
III „	14 „	

B. Garden leaves.

7. From Csetnek.

I quality...	20 florins.	
II „	15 „	
III „	8 „	

8. Fine leaves stemmed, from Fadd, Vék, O-Gyalla, Debro, Vitnyéd, and first-rate Transylvania.

I quality...	14 florins,	50 kreuzers.
II „	11 „	
III „	8 „	

9. Leaves from Vitnyéd, Keszekfalva, Jánoshát, Vicsenheit, Fibisch (in the Banat), Nagy-Dorogh, and the middle fine from Transylvania.

I quality	11 florins	
II „	9 „	
III „	6 „	50 kreuzers.

10. The finest selected leaves, tobacco for pipes from the country of Debreczen, 12 florins.

It is to be remarked that the tobacco enumerated under A. is used for cigars and snuffs, while that under B. is for pipe smoking.

By private merchants it is purchased also at different prices according to the places; but

16 florins per Aust. cwt., best quality;

10—12 florins, second quality; and

6—8 florins, the lowest quality,

may be taken as the average prices.*

Among the wholesale merchants engaged actually in the export trade may be mentioned:

a. Schossberger, L. W., in Pest, who has taken about 2,000 yokes from the area allotted for the production of tobacco for export.

b. Lederer, brothers, in Pest, with 1,500 yokes.

c. Kohn Jzidor „ „ 1,000 „

d. Kohen, brothers „ „ 500 „

It is only lately that the restrictions on the production have ceased, but since that time the tobacco-planting and trade have very much augmented, and besides the above-mentioned firms there are also others engaged in it.

Schossberger has now about 30,000 cwt. for sale, of which one part consists of the most excellent leaves suitable for cigar covers.

WINE.

As regards the production of wine, Hungary is one of the most important countries in Europe. Its annual produce is exceeded only by that of France, while for quality of material it stands unrivalled.

The wines were till now not sufficiently known, because, owing to different causes, only a very small quantity went

* According to the latest news the price is increasing.

abroad, and to the same circumstance can, and must be ascribed, that wines perfectly prepared are not to be found in considerable quantities. But still a larger supply is kept in store than hitherto demanded for exportation. The right sources must be applied to, and excellent qualities will be found in great quantities. There are some growers in whose cellars thousands of eimers are stored waiting for purchasers; but there are also some creditable merchants who could supply on demand 15- to 20,000 eimers of good wine.

To give an approximate idea of the scale upon which the production of wine is carried out, it will suffice to mention, that in Hungary, (without Transylvania, Croatia, Esclavonia, and the respective military frontier), to the culture of the wine 591-356 yokes (or per 800 square klafter, 1-182-712 quarters) are allotted; the yearly produce (on a quarter about 20 eimers*) amounts nearly to 24,000,000 eimers; of this, as far as we know our wines up to the present time, about 3,000,000 eimers is of such a quality that by proper management it can become an article of exportation.

Superior wines are produced in the following districts:—

The Yearly production.	Eimers.
I. Tokai-Hegyallya in about 19 places ...	268,000
II. " the vicinity of it 25 places ...	130,000
III. Ménes-Magyarát, about 14 places ...	241,000
IV. Ruszt and the county of Sopron (Oedenburg) about 19 places ...	59,000
V. Somló and the county of Veszprém in about 7 places ...	25,000
VI. Badacson and the environs, of the Lake Balaton, in about 10 places ...	90,000
VII. Neszmély and its environs, in about 7 places ...	80,000
VIII. Ermellék in the county of Bihar, in about 20 places ...	240,000
IX. Eger-Visonta, in about 19 places ...	240,000
X. Szegzárd in the county of Tolna in about 13 places ...	150,000
XI. Villány and its environs, in about 11 places ...	80,000
XII. County of Baranya, in about 11 places ...	400,000
XIII. Buda and the environs, in about 6 places ...	400,000
XIV. Pest-Kobánya (Steinbruch), in about 7 places ...	50,000
XV. Szerednye, in about 8 places ...	60,000
XVI. County of Nográd, in about 14 places ...	150,000
XVII. County of Hont, in about 14 places ...	40,000
XVIII. County of Posony (Pressburg), in about 11 places ...	100,000
XIX. Vágh-Ujhely, in one place ...	6,000
XX. County of Fehér (Stuhlweissenburg), in about 8 places ...	60,000
XXI. County of Somogy, in about 10 places ...	40,000
XXII. County of Vas, in about 19 places ...	60,000

Together 272 places; yearly, 2,969,000

The enumerated localities are already known in the country, but there are besides them many others where a superior quality of wine is produced, but which is not sent to the market.

First rate "Ausbruch" and dessert wines are produced in Tokai-Hegyallya and its environs, Ménes-Magyarát Ruszt, Sopron (Oedenburg), Badacson, and the environs of the lake of Balaton.

Excellent red table wines, which can be compared to the best French wines, come from Eger (Erlan), Visonta, Szegzárd, Villány, the county of Baranya, Buda and its environs, Vágh-Ujhely, &c.

The best places for white table wines are Magyarát, Somló, the county of Veszprém, Badacson, the environs of the lake of Balaton, Neszmély, Ermellék, Pest-Kobánya (Steinbruch), Szerednye, the counties of Nográd,

Hont, Posony (Pressburg), Fehér, Somogy and Vas (Eisenburg).

The first qualities of the Somló wines, if properly treated, are not inferior to the best southern. Notwithstanding the excellence of their quality Hungarian wines are very cheap; the reason of this is, because they are not exported, and even, as regards England, may be said to be unknown. The present International Exhibition affords the first occasion for the English public to judge of their worth.

The best table wines can now be had in Hungary in great quantities—10, 15, 20 florins the eimer; common good wines for 6, 8, 10 florins.

If English capitalists would join us, and if thus the English market could be secured for our wines, the trade in Hungarian wine would soon be one of the most important and most lucrative.

The freightage per cwt. of wine (which is about the weight of one eimer in cask) on the railway, including also the Channel, as far as London, is at present about 6—7 florins; *via* Trieste it is, of course, cheaper, especially if English vessels could carry it as return cargo.

Besides the great quantity and large variety of dessert and table wines, there is a great amount of material fit for distillation, and with a little capital, cognac factories could be established, for this article, as such, or as a means of adjusting the respective wines, to correspond with port or sherry.

WOOL.

Hungary produces every year about 230,000 cwts.* of wool, of which 118,000 cwts. are fine, and 112,000 cwts. common quality.

The wool production is represented at the International Exhibition by the following growers:—

1. Baron Simon Sina the yearly production	3,085 cwts.
2. Count Lewis Károlyi	1,031 "
3. Prince Philip Batthyányi	1,000 "
4. Counts George Camillo and Aladár Zichy	1,000 "
5. Count George Festetics	700 "
6. Count Stephen Károlyi	700 "
7. The Estates of the Primate of Hungary	500 "
8. Count Edmund Zichy	500 "
9. Count Maurice Sándor	450 "
10. Count Dyonis and Emeric Széchenyi	320 "
11. Count Paul Pálffy	280 "
12. Prince Saxon-Coburg Gotha	260 "
13. Count John Waldstein	100 "
14. The Abbey of Csorna	100 "
15. Paul Kis de Nemeskér	80 "
16. Count Julius Jankovich	80 "
17. Count George Andrassy	70 "
18. Count Felix Zichy-Ferraris	70 "
19. The Crown-Estate of Old Buda	30 "
20. Baron Nicolas Vay	30 "
21. Robert Czilchert (Juror)	30 "
22. Conetantine Gyikó	28 "
23. Edward Egan	10 "

The staple place for the wool is Pest, where it is (during the fairs held quarterly) bought by foreign merchants, either directly or through the medium of the home merchants.

The greatest part of the fine wool is grown on the estates of the great landowners. B. S. Sina produces now the greatest quantity. A thousand or more cwts. are produced yearly by several land proprietors, as: Count Zichy de Lángh in the county of Fehér (Stuhlweissenburg), C. Lewis Károlyi, C. George Károlyi, Prince Philip Batthyányi, and many others.

Less than 1,000, but above 500 cwts. are produced by a great number; and under 500 downwards to 100 by a great many land-owners.

The quality is well represented by the exhibited

* 1 Eimer=11·8 gallons.

* 1 Austrian cwt.=100 Austrian pounds=123 English pounds 7 ounces, and 5 drachms.

fleeces, of which a great many have been found entitled to the distinction of a Prize Medal; although they were acknowledged imperfect, owing to the fact that the sheep were shorn for the sake of the Exhibition one-and-a-half months earlier than usual, and also because the washing is not as it should be, the time when it took place having been too cold.

FOREST PRODUCTS.

The area covered by Forests is nearly one-fourth of the whole land; but it is not equally distributed, and therefore in parts destitute of wood the price is sometimes exceedingly high, whilst in the forest-districts it scarcely can be sold.

The greater forests are to be found in the counties of Arva, Túrocz, Liptó, Máramaros, Trencsén; the upper part of the counties of Zemplén, Ung and Beregh; and in the counties Krassó, South-Bihar and Arad, the parts contiguous to Transylvania. The counties Baranya, Somogy, Veszprém and Somogy abound also in timber; but as regards the export-trade none of the enumerated tracts of land are superior to Esclavonia, being the nearest to the Adriatic.

In the forests are to be found pines, common and turkey oaks, and beeches; in less quantity, maple, alder, ash, and the lime-tree.

The pine is chiefly to be found in the counties of Máramaros, Arva, Túrocz, and Liptó; but in less quantity it is spread over a great area, commencing from Pressbourg on the summit of the Carpathian range, as far as the southern end of Hungary in the Banat, and besides that it occurs also in the counties of Baranya and Vas.

On the more temperate mountain chains the beech and oak abound, especially the counties of Krassó and Somogy, which are famous for their beech forests. As timber used in husbandry, it is said that none is superior to the beech.

The plains produce chiefly the turkey and the common oak.

The trade in wood is carried on by means of the rivers, and is most extensively practised on the Theiss, with the wood derived from the forests in Máramaros, Beregh and Ugocsa. Besides that, a considerable trade is carried on on the Szamos, Körös, Berettyó, and more on the Maros. The staple places along the river Theiss are: Tisza-Ujlak, Tisza-Füred, and especially Szolnok and Szeged; on the river Maros: Lippa, Arad and Makó.

Towards the valley of the Danube the greatest part of the wood is transported on the river Vág, from the counties of Arva, Túrocz, Liptó and Trencsén; the staple places being Hradek, Rozsahegy (Rosenberg), Zsolna, Vág-Ujhely, Szered and chiefly Komárom, which place supplies with wood for building purposes the whole country down the Danube as far as the Turkish boundaries.

On the rivers Garan and Jpoly also much wood is conveyed; but none of the rivers is superior in this respect to the Dráva (Drau), for the wood derived from the mountains of Styria and Croatia. A considerable quantity of wood is transported on the Danube, also from Austria and Bavaria to Pest, where a most extensive trade is carried on.

The price of the wood has of late years greatly augmented; the chief causes of this are the great undertakings in building and railroads, where it is used very often as fuel. It may be stated, that the price of the timber is about the quadruple of what it was 15 or 20 years ago; but still many forests can be found, where wood is almost unseizable for want of means of conveyance.

As an average the price of 1 florin and 1 fl. 20 kr. may be taken for one cubic foot of timber of the first quality for building purposes and for agricultural and domestic utensils. Extraordinary size from 1 fl. 20 kr. to 2 fl.—That is for hard wood, the soft wood is about one-third less in price.

The price of the staves per eimer varies according to size, from 60 to 80 kreuzers.

For the English market, as a suitable place, may be men-

tioned Sziszek on the river Száva (Save), where the timber, as compared to the prices at Pest, is cheaper from $\frac{1}{3}$ to $\frac{1}{2}$.

FLAX AND HEMP.

The flax and hemp might also become articles for exportation.

The northern districts are excellently suited for the growth of flax; especially the counties of Szepes (Zips), Sáros, Arva, Túrocz, Liptó, Trencsén, Zolyom, and even Máramaros and Vas.

In the southern parts of Hungary the culture of flax gives place to that of hemp. As places producing this material of a superfine quality may be named the county Bács and the southern part of the county Pest-Solt. The production of this place is an article of trade under the name "Apathin hemp,"* and may annually amount to about 150,000 cwt. (Austrian weight). As to the fineness of quality it may be inferior to the hemp of other countries, but as to strength of fibre it yields to none.

The production could be much more extended, the predilection of the people and a good soil being in its favour; it depends only on the demand for exportation.

The price of the hemp is variable, according to the quality. The principal merchants at Pest are J. Birnbaum, an exhibitor, to whom a prize medal was awarded; John Aigler, Michels Brothers, and Joseph Pessl.

The prices at the market of Pest are as follows:—

a. Rough hemp	16½—17 florins the Vienna cwt.
b. Hemp for ropes	23½ " "
c. Mixed hemp for spinning	29 " "
d. Fine tow.....	10 " "
e. Rough tow	7—8½ " "

THAMES EMBANKMENT.

The following are the reports just made by Mr. Bazalgette, the chief engineer to the Metropolitan Board of Works:—

NORTH SIDE.

GENTLEMEN,—The Thames Embankment Act, and the Plans referred to therein, define in general terms the main features of the work entrusted to this Board for execution. But it remains for the Board to determine with what materials the embankment should be constructed, what should be the depth and character of its foundations, and its solidity and strength; also, what should be the general appearance or design, whether it should be constructed with or without a cofferdam, and the mode of forming the low-level sewer, with its branch connections; and all other matters of detail.

The Act provides that the powers of the Board for the compulsory purchase of property shall not be exercised after the expiration of five years from the passing of the Act; but it does not limit the period for the execution of the work.

Clause 12 provides that, "In carrying the said works and improvements into execution, it shall be lawful for the Board, save as herein otherwise expressly provided, to deviate to any extent not exceeding five feet from the levels defined in the said sections, and the Board shall not deviate beyond the limits of deviation delineated in the said plans without consent of the person through whose lands such deviation shall be made, nor carry the line of embankment wall, as shown in the said plans, further into the said stream of the river than three feet, without the consent of the Conservators signified in writing under the hand of their secretary," which, in the judgment of your solicitor, enables the Board to extend the line of the embankment-wall into the river three feet only beyond that line, as defined on the Parliamentary plans, without the consent of the Conservators of the Thames; or to the limits of deviation with the consent of the Conservators; but under

* The name of a village in the county of Bács, on the Danube, being also a steamboat station.

no conditions beyond those limits. The limits of deviation being at a distance of 100 feet.

The face of the embankment is to commence at the northern abutment of Westminster-bridge, in a line with the existing embankment in front of the Houses of Parliament, and it will extend in a slightly curved line to the northern brick pier of Hungerford-bridge. At Richmond-terrace it will be 220 feet in front of the present high-water line, at Scotland-yard 400 feet, and at Hungerford-bridge 300 feet. From Hungerford-bridge it will continue to the first pier of Waterloo-bridge, and opposite Buckingham-street it will extend 450 feet into the river; opposite Salisbury-street, 300 feet; and opposite Somerset-house, 130 feet. The solid embankment is to terminate on the eastern side of Temple-gardens, where it will extend about 200 feet into the river.

A roadway 100 feet wide is to be formed upon that portion of the embankment nearest the river. From the junction of this roadway with Westminster-bridge it will fall at an inclination of 1 in 80 to the level of the embankment, which is to be 4 feet above Trinity high-water mark. The roadway will pass under Hungerford and Waterloo bridges; and at the east end of Temple-gardens it will be reduced to 70 feet in width, and be carried upon columns rising at an inclination of 1 in 60 to the level of Chatham-place, Blackfriar's-bridge.

The River Thames at London-bridge, has a clear waterway of about 700 feet; at Southwark-bridge the waterway is reduced to 660 feet. It then rapidly expands in width, and will, when the embankment is formed, be 900 feet wide above Blackfriars-bridge; 1,120 feet at Waterloo-bridge; 1,020 feet at Hungerford-bridge, and 900 feet wide at Westminster-bridge.

The tidal water in passing through London and Southwark bridges flows with sufficient velocity to keep the channel of this portion of the river free from deposit; but when allowed to expand and spread itself over nearly double the width of river, as it will still do at Waterloo-bridge, the velocity of the stream is decreased, and a partial and contracted channel for navigation is formed in the north bend of the river; and banks and shoals are deposited on the south side. This will still continue to be the case after the embankment is formed, and these evils might have been much reduced had the embankment been extended out to the second, instead of the first pier of Waterloo-bridge. The bend in the river might thus also have been materially reduced, a more uniform section of river obtained, and eight acres of additional land thereby reclaimed.

The limits of deviation do not, however, extend to the second pier of Waterloo-bridge, and it would be unwise to carry the line of embankment out to the limit of deviation, for it would then leave a narrow channel between the face of the embankment and the second pier of the bridge, and the embankment, unless extended to the second pier, would not admit of the formation of a roadway within the second arch of the bridge. However desirable, therefore, it may be to extend the embankment at this point further into the river, the Board could not do this efficiently within the limits of deviation, and would therefore be obliged to obtain from Parliament fresh powers to enable them properly to effect this improvement. Such a course would necessarily involve a year's delay, and as the Board are not responsible for the defect, they may not deem it prudent to incur the delay.

The approaches or connecting roads between the embankment roadway and the existing streets are to be formed in the following manner:—A roadway not less than 40 feet in width, and with an inclination of not less than 1 in 30, is to be carried in the form of a crescent to the foot of Arundel, Norfolk, and Surrey streets, in the Strand.

A new street is to be formed from Wellington-street, opposite Somerset-house, falling in at an inclination of 1 in 40 under Hungerford-bridge, near to Northumberland-wharf, and connected with Whitehall-place by a pro-

longation thereof. Branch connecting streets from this new street are to be made in continuation of Cecil-street, at an inclination of 1 in 50; Salisbury-street at an inclination of 1 in 63; George-street at an inclination of 1 in 125; Buckingham-street at an inclination of 1 in 127, and Villiers-street at an inclination of 1 in 60. A street connecting Whitehall, opposite the Horse Guards, with the embankment roadway is to be formed through Whitehall-yard and Whitehall-stairs, nearly on a level.

The approaches to the embankment roadway will require your careful consideration, inasmuch as the usefulness of that roadway will depend mainly on the facilities which are provided for connecting it with the existing lines of thoroughfare. The streets which run at right angles from the Strand down to the embankment (Norfolk-street excepted) are so narrow and steep as to be very inconvenient as public thoroughfares. Norfolk-street, which forms the best approach, is 40 feet wide, and has an inclination of 1 in 25.

A convenient communication between Charing-cross and the roadway on the embankment should form a prominent feature in the design, and would probably tend to relieve the Strand and Fleet-street more than any other; but provision has not been made for such a line of communication. The most direct and most convenient route that could be suggested would unquestionably be in a direct line through the gardens close to the back of Northumberland-house; but if that should be regarded as too bold and costly an approach, I submit that a very advantageous one may be obtained by purchasing the block of houses between Northumberland and Craven streets, and passing in a curved line from the east corner of Northumberland-house, between Northumberland and Craven streets, on to the embankment roadway. This route, from Charing-cross to the east, would be 400 feet nearer than by Whitehall-place, and 100 feet nearer than along the Strand and down Norfolk-street; and its inclination would be not less than 1 in 56, which is much better than could be obtained by the other routes. It would also most effectually relieve the present thoroughfares where they are most crowded.

I submit, also, that the high level roadway, instead of starting from opposite Somerset-house, in the narrow part of Wellington-street, should commence in the Strand at its junction with Wellington-street, and may be otherwise advantageously modified, as shown upon plans which have been prepared for the consideration of the Board.

These diversions would be more or less beyond the limits of deviation marked upon the deposit plans, and would therefore require the deposit of fresh plans, and a fresh application to Parliament; but inasmuch as the streets cannot be formed until after the embankment is made, there will be time for this without retarding the embankment.

The Act contemplates the filling in behind the embankment, with the materials dredged from the bottom of the river, and clause 16 provides, that the Thames Conservators shall, when called upon by the Board so to do, dredge the river where and how they think best, and deposit the materials where the Board shall point out; and the Board shall pay to the Conservators such sums of money as they shall have actually expended in this work, but if the Conservators should not, within ten days, after having been called upon by the Board so to do, proceed with the dredging, then the Board may, without the consent of the Conservators proceed with this work.

There will be great practical inconvenience in this mode of executing the work. It will be obvious to the Board that although Parliament has given large powers to the Conservators to dredge the bottom of the river, at the request of the Board, the constant interchange of notices and proceedings, to enable a second body to carry out rapidly and effectually the requirements of the Board in regard to this great work, must necessitate great delay and inconvenience. Now the embankment wall and other works might be destroyed by the tides after completion,

for the want of sufficient backing, or by reason of a defective mode of filling in, or by delay; and the contractors for the embankment would not have due control over their own contracts. I submit that the only practical mode of performing these works properly, will be by an agreement between the Metropolitan Board of Works and the Conservators of the Thames, to the effect that the Metropolitan Board of Works shall themselves, in the name and on behalf of the Conservators, dredge so much of the river as they shall require for the formation of the embankment, in such places, and to such depths, as shall be pointed out by the Conservators, within prescribed limits; and that the contractors for the embankment shall be bound under their contracts to do this work to the satisfaction of the Board and the Conservators.

Should any difficulty arise in effecting such an arrangement the Board could not depend upon the materials raised from the river for the formation of the embankment, and would be driven to obtain such materials from other sources.

Clause 21 requires that when the Board shall interfere with any existing piers, public stairs, or landing-places now marked by the Watermen's Company, they shall erect other piers, stairs or landing-places, to the satisfaction of the Conservators of the Thames, which, when completed, shall be vested in them.

The borings along the line of embankment are now nearly completed, and the result, up to the present time, indicates that it will be necessary to carry the foundations of the embankment down to the blue clay, which, on the average, will be about 25 feet below the present bed of the river. This will, I believe, be found to be most economically effected by sinking iron caissons, filled with concrete for the foundations, and by raising upon them, from below the level of low-water mark, a solid granite-faced embankment, without the aid of a coffer dam.

The low level sewer will be constructed behind and under the protection of the embankment wall, which will greatly facilitate the formation of those works.

The embankment may probably be advantageously divided into two contracts, but the numerous points which have been touched upon in this preliminary report will require the deliberation of the Board before I receive instructions to mature the designs and prepare the contracts for the execution of the work. The works cannot, however, be carried out until possession is obtained of the property and interests along the foreshore of the river which will be interfered with; and I recommend that arrangements be forthwith made to promote this object, and that the proper officers be instructed to prepare and serve the notices, and push forward this necessarily tedious part of the business without delay.

SURREY SIDE.

Extract from Minutes of Main Drainage Committee, 14th October, 1862.

The Committee considered further the course to be pursued by the Board, in reference to the report of the Royal Commission on an embankment for the South side of the river, referred by the Board on 8th August last (No. 13).

Resolved,—That the further consideration of the subject be adjourned; that in the meantime the report in question be referred to the engineer, and that he do report thereon to the Committee this day week, and also as to dealing with the fore-shore of the South side of the river, between Westminster and London-bridges.

GENTLEMEN,—Pursuant to the foregoing instructions, I beg to report that the Thames Embankment Commission have divided this district into three sections; the first extending from Deptford to Westminster-bridge; the second from Westminster-bridge to Vauxhall-bridge; and the third from Vauxhall-bridge to Battersea-park.

With reference to the first section, the Commission have regarded the existing thoroughfares, coupled with the new street now being formed by you, sufficient for the

accommodation of the traffic; and they believe that the flooding of those districts may be obviated by a more efficient system of drainage, and consider that no public necessity exists for an embankment for this section. They, however, admit that such an embankment would improve the navigation of the river, increase the wharfage accommodation, and ensure uniformity of design, and recommend that every facility should be afforded to the wharf owners and occupiers to enable them to do this work, should they desire it.

With respect to their second and third sections, they recommend the formation of an embanked roadway from Westminster-bridge to Battersea-park, about 4ft. 6in. above Trinity High Water Mark, and 70ft. wide, and two miles in length; to be on an ornamental viaduct opposite the Houses of Parliament to Bishop's-walk, then on a solid embankment, with the exception of a further length of arching from the London Gas Works to Nine Elms.

They further recommend the dredging of this portion of the bottom of the river to a level five feet below low water, and estimate these works, with the requisite approaches, at £1,100,000.

I submit for your consideration, that a more convenient sub-division of this district will be to regard the distance from Deptford to London-bridge as the first section, from London-bridge to Westminster-bridge as the second section, and from Westminster-bridge to Battersea-park as the third section.

The first section, then, according to the sub-division, has not been referred to me by you; and indeed does not require your immediate consideration, inasmuch as no works are at present contemplated for this section on the North side which would affect the South.

With respect to the second section, viz., from London to Westminster bridges, I am unable to concur in the views arrived at by the Royal Commission, excepting so far as regards there being no necessity for the formation of a roadway along the fore-shore of the river. Indeed, the Commissioners, in admitting that an embankment would improve the navigation of the river and ensure uniformity of design, have themselves made out a case of public necessity for such an embankment; which, however, they do not admit. But there are other, and still more cogent reasons why such an embankment should be, and must eventually be constructed.

It has been stated in evidence before the Commissioners that the existing embankments are defective, and that the low-lying districts behind them are consequently flooded at high tides; and my own personal observation confirms these statements. The foundations of many of these embankments are very shallow and defective, some of them not being more than three feet in depth; so that when the embankment on the North side is completed, and the mud banks and shoals in the river dredged away, and the strength of the tide-way brought over nearer to the South side, the safety of these wharves will be endangered; and they will assuredly, if they are not attended to, be undermined and come down.

For these reasons, I am of opinion that this section of the South side of the river must be embanked to an uniform line; and it cannot be left to the option of the different owners and occupiers of the property to deal with this embankment in detached sections as they think best. I recommend that powers should be given to this Board to construct such an embankment, the cost of which I have estimated at about £250,000; and that the property reclaimed should be given to the adjoining owners, and the Board should have power to charge such property, with a portion of the cost of the formation of the embankment, proportionate to the value and extent of the property so reclaimed and added to their premises.

In this way, the property reclaimed would pay the owners for the cost of reclaiming it, and the Board would receive back the greater portion of the outlay; so that the public would thus derive a great public improvement at a very small cost.

As to the particular mode of raising the money, and adjusting its repayment by the owners of the property improved, the members of the Board, should they adopt this view, are more competent to judge than myself.

The Commissioners have recommended works for the improvement of section No. 3, the main features of which this Board would doubtless desire to see carried out, and the details connected with which will probably be carefully reconsidered before Committees of the Houses of Parliament during the coming Session.

I have the honour, &c.,

(Signed) J. W. BAZALGETTE, Engineer.

NEW SYSTEM OF LIGHTING THEATRES IN PARIS.

On the Place du Châtelet, which is one of the bold openings cut through the mass of buildings of old Paris for the formation of the Boulevard Sebastopol, two new theatres have recently arisen, both claiming high rank in architectural design. These rival structures face each other, from opposite sides of the Place; one being the Théâtre du Châtelet, replacing the *Cirque*, and the other the Théâtre Lyrique. The Théâtre du Châtelet, with which we have to deal at present, exhibits by far the more effective façade, in consequence of the large open gallery or loggia which forms its principal feature. The design of the basement story, with the decorative entrances, is good, and sufficiently massive to form a characteristic support to the loggia above. This last feature is formed of open arcades, which support the upper story; both arcades and the architectural features above being richly decorated with ornamental sculpture of a very superior kind. The loggia of the ceiling, as well as the inner sides of the arcades and the back, are richly decorated with arabesque paintings; and the warmth and colour so obtained, combined with the depth of shadow beneath the arcades, produce an effect which is indisputably fine, and, in northern architecture, quite original; though but a successful piece of borrowing from an architectural device which is common enough in Italy. This open loggia, or spacious covered balcony, forms an agreeable *salle de promenade* between the acts; and we recently found it a most agreeable lounge on one of the hot October evenings of this exceptional season.

The interior of this graceful theatre is constructed after a fashion still farther from the vulgar beaten tract than the exterior. There is no architectural proscenium; the tiers of boxes sweeping round in a richly undulated curve till they abut against the sculptured bordering which, from floor to ceiling, frames the front of the stage, as it would a picture. The second innovation occurs in the projecting balcony, which in most French theatres runs round the front of the principal tier of boxes, having an even depth of one, or at most two, rows of seats. In the present instance, however, the balcony feature is made to deepen in the centre, projecting far over the pit, and having, in its deepest part, 10 or 12 rows of seats. Here it is that the greatest amount of light falls, and that toilettes are seen to the greatest advantage. It is a central section of this portion of the house that is destined to be set aside for the imperial family, when visiting the Théâtre du Châtelet. The decorations of the *salle* also present a general novelty of effect. There is little of that heavy sprawling class of ornament, in impertinently high relief, so common in theatrical decoration; the principal effects being obtained by contrasts of burnished and dead gold, blended together, and subdued by a soft ground of delicate buff, which is relieved, sparingly, by sparkling traces of white. Among that class of ornaments intended to convey some, more or less, appropriate meaning, there are none of those bothering allegories, the pith of which is so difficult to extract; the only ornamental features intended to illustrate, more or less directly, the purpose of the structure being a series of medallions of the great patrons of art in all ages. These are placed on the fronts of the upper tier of boxes, and

although the selection has been made in the reign of Napoleon III., former sovereigns of France are not excluded. Francis I. and Louis XIV. are allowed to hold their ground against Napoleon I. and Napoleon III.; though these last appear to have assumed the chief places of honour, flanked as they are by Pericles and Augustus. The last and by far the most important of the novelties of structure and decoration attempted (successfully attempted) in this new theatre, is the entirely original mode of lighting the *salle*. Not a single chandelier appears, large or small; and yet the house is perfectly lighted, and the richness of the architectural effect, strange to say, seems absolutely to gain by the absence of those glittering accessories of glass and lights, which usually form such principal features in theatrical interiors. In lieu of these we are presented with a ceiling of ground glass, sparingly decorated with elegant arabesques; from above which, and unseen, are jets of gas, arranged in a concentrated mass, which pour down a flood of softened and equalised light through the semi-transparent ceiling, the intensity of which can be heightened or diminished at pleasure. It was at first suggested by some of the art-critics of the French press, that the light so introduced was *not* brilliant—that it produced the effect of imperfect sunlight during an eclipse; in short, that the new system was less advantageous than the old ones. Farther experience has, however, proved its triumphant success, both in an artistic and sanitary point of view; in so much that it is now determined to light the Théâtre Lyrique in the same manner, and a Viennese architect visiting Paris, who has seen it, has at once advised its adoption in the new theatre now building at Vienna. Not only is the glare of the chandelier, by which the view of the stage from some parts of the house was obscured, effectually removed, but the unwholesome heat and noxious fumes produced by a number of gas-lights are also got rid of, a most important improvement, which should not be lost sight of in the construction of new theatres, while it is a system that might, with moderate outlay, be applied to all our existing theatres. When the performance begins, the brilliant lights of the *salle* are reduced to exactly that point calculated to give just the proper amount of due predominance to the lighting of the stage, without, at the same time, leaving too little light in the house, upon which the full power of light is again thrown between the acts, during which intervals the interest of the toilette, &c., is supposed to be in the ascendant.—*Building News*.

ASSOCIATION FOR THE PREVENTION OF STEAM-BOILER EXPLOSIONS, MANCHESTER.

At the last ordinary monthly meeting of the Executive Committee of this Association, held on Tuesday, October 28th, William Fairbairn, Esq., C.E., F.R.S., in the chair, the chief engineer presented his monthly report, of which the following is an abstract:—

During the past month there have been examined 353 engines and 539 boilers. Of the latter 9 have been examined specially. 9 internally, 48 thoroughly, 473 externally, in which the following defects have been found:—Fracture, 7 (1 dangerous); corrosion, 30 (3 dangerous); safety-valves out of order, 15; water gauges ditto, 7; pressure gauges ditto, 20; feed apparatus ditto, 7; blow-off cocks ditto, 27; furnaces out of shape ditto, 3; blistered plates, 5. Total, 121 (4 dangerous). Boilers without glass water gauges, 8; without pressure gauges, 7; without blow-off cocks, 18; without back pressure valves, 50.

Three explosions have occurred during the past month to boilers not under the inspection of the Association, these boilers were in the iron districts, and of the externally-fired hay stack class; they were reported as having been of original defective construction, being insufficiently stayed. One of these explosions was attended with fatal consequences, the engineman being killed.

INCORUSTATION AND SCUM PIPES.—The number of boilers under inspection which suffer from incrustation is very

large; indeed, to escape this inconvenience is quite exceptional. It forms a considerable impediment to satisfactory inspection, since it renders it difficult to ascertain the actual condition of the plates; it sometimes gives a delusive appearance, and leads to undue suspicion of corrosion, but more frequently it conceals defects, since corrosion is often found to be going on under, and to be caused by, the deposit.

In addition to the waste of fuel occasioned by incrustation, the wear and tear of boilers is considerably increased, apart from the effects of over-heating. Thus internally double-flued boilers suffer from the undue longitudinal expansion given to the furnace crowns, which increase the tendency to groove at the front end plate, an action always more or less developed in these boilers, while incrustation renders the use of tubular boilers altogether impracticable in localities not supplied with good water, and thus prevents the more general use of this economical class of boiler.

Although the danger of allowing incrustation to form on plates exposed to the action of the fire is too fully appreciated to need remark, the fact is not so fully recognised that even where no actual cake of deposit is formed, over-heating frequently occurs. It is thought that this may, in many cases, be due to the presence of thickening matter held in suspension in the water, and it would be interesting to ascertain by experiment whether the impediment thus presented to the free escape of the steam does not—where the circulation is imperfect, or no such agitation of the boiler takes place as in locomotives when running—lift the water off the plates, and thus cause over-heating. Of the fact of over-heating occurring where no incrustation is formed, and with an ample supply of water in the boiler at the time, there is no doubt instances are constantly coming under notice, and it may be added that they are chiefly found to take place in boilers externally fired.

Apart from the injury done to the boilers from incrustation, a considerable amount of earthy matter passes over with the steam into the engines, and thus renders necessary the use of an increased amount of tallow for the piston and slides. This, though too frequently lost sight of, is illustrated by the fact that where boilers are fed from brooks, subject, on heavy rains, to sudden torrents which stir up the mud, the engine attendants are in the habit, at such times, of taking the precaution of giving the engine cylinders an extra amount of lubrication, finding the pistons, &c., to clog when this is neglected.

Under ordinary circumstances, the most practical plan for the prevention of incrustation is the adoption of an efficient mode of "blowing-out," and not the use of "boiler compositions." To blow out, however, from one point only, at the bottom of the boiler, which is the general custom, has but a very limited and local effect. This is frequently remedied by the adoption of a perforated pipe, which is connected to the ordinary blow out tap, and carried along the bottom of the boiler from one end to the other. These are technically termed "Topham-pipes," from the name of the patentee, and are generally spoken highly of by those of our members who have adopted them. They are, however, more successful where the sediment being heavy and sludgy falls to the bottom, than where it is of a lighter character, which frequently forms the hardest and most tenacious scale.

From the rapid ebullition that takes place within boilers when under steam, it is found that a greater part, if not the whole, of the sediment set free by evaporation rises to the top of the water, forming a coat of scum, before finally depositing itself upon the furnace tubes or shell; and thus the readiest way of preventing incrustation is to blow out this layer of scum from the surface of the water by means of a scum pipe, before it has an opportunity of settling. There is nothing new or experimental in this; the system has been for years adopted with marine boilers, and there is no reason why its use should not become equally general with stationary ones. Many of our members have already tried it with considerable success, and find, on opening

their boilers after a month or six weeks' work, that where they used formerly to be coated with a heavy muddy deposit they are now perfectly clean.

The following is an explanation of the description of pipe adopted:—It is about three or four inches in diameter, having a wing cast to it on each side, so as to form a trough throughout the entire length of the pipe. This pipe is carried within the boiler, from one end to the other, being made in any convenient lengths for introduction at the manhole; it is perforated with small holes on the top all the way along, the aggregate area of the whole number of these holes being equal to that of the pipe itself. The top of the trough is fixed a few inches below the level of the water, so that the scum on the surface may flow over it, when, being guarded from the disturbance of the ebullition, it deposits in the still water above the trough the sedimentary particles held by it in mechanical combination. A tap is fixed to the front end plate of the boiler, in communication with this pipe, by means of which it can be blown out as frequently as is desired, which should not be less than once every two hours, when ebullition is going on. This tap, which need not be more than two inches in diameter, should be entirely of brass, fitted with a gland, and have a neat waste pipe attached, which may be of wrought iron, while also the waste pipes from the glass water gauges may be connected to it, being led immediately under the dead plate, which arrangement is found to be very compact and convenient. The best position for the scum pipe is at the side and not at the centre of the boiler, both on account of facility in fixing, and convenience of getting inside. A single pipe is sufficient.

The above description is not by any means given as if that were the only form of scum pipe that could be advantageously applied. It was designed for the use of the members as being adapted to stationary boilers, simple in construction, affording a large collection area, and being free from any patent right. Upwards of a year's trial has proved it to be successful, and its more general adoption is consequently recommended. These pipes have already been made by the manufacturing engineers of Rochdale, Bolton, Bury, and other places, but are needed more generally, and a drawing at the office is open to inspection for the benefit of the members.

There are other plans in operation which, however, are subject to patent right. One of these consists of a series of vertical pipes, fixed in the centre of the boiler, each pipe having a trumpet mouth, to which a vertical telescope movement is given, to allow for the changes of water level, the movement being effected by a copper ball float, so that the trumpet mouth rises and falls on the changes of water level, like a buoy on the rise and fall of the tide; the object being to keep the mouth of the pipe immediately below the surface of the water, in close proximity to the scum. A second plan consists of a trumpet mouth laid horizontally. Both of these arrangements are reported to give satisfaction, and, whenever opportunity offers, the results of their working will be noted, and particulars of the plan found to be most successful communicated to the members.

Some descriptions of incrustation, however, cannot be entirely removed by any blowing-out apparatus alone, however perfect; in such cases a little carbonate of soda may be added, which many of our members have applied with considerable success. Of the use of this, their experience is decidedly in favour, while the testimony with regard to complicated "boiler compositions" generally, is that they found them expensive, in many cases useless, in others injurious, and have, in the majority of instances, discontinued them altogether. For fuller chemical particulars refer to Dr. Angus Smith's report to the Executive Committee upon the Incrustation in Boilers. The use of soda, without a scum pipe, is found in some cases to induce priming; the soda combining with the grease within the boiler, and producing foaming of the water.

The general adoption of scum pipes is, therefore, confidently recommended to the members, not only for the

prevention of incrustation, but also, in order to lengthen the lives of their boilers, as well as to assist the engines in many cases, by preventing priming.

The most radical cure for the prevention of incrustation, though one involving considerably more outlay at the first than the above, will be found in the adoption of dry or "surface condensation," by means of which the boiler is fed with distilled water, the same being used again and again, with the exception of the slight amount lost through leakage. To those who are paying large amounts annually for a supply of town's water, and where the steam is consumed for engine purposes, the adoption of surface condensers is well worthy of serious consideration, not only on account of the saving in the water rates, but also in that of fuel, since non-condensing engines may, by this means, be converted into condensing, which is not at present generally the case where town's water is used.

Home Correspondence.

THE ELEMENTARY EXAMINATIONS

SIR,—Allow me once more to call the attention of the managers of Institutes who read the *Journal*, to the importance of extending so valuable a stimulus to self-improvement to a class of persons who form the majority of the pupils of evening classes, and who have not hitherto been influenced by any practical incentive to perseverance. The Examinations conducted by the Society of Arts have afforded very many substantial advantages to the young men whose previous attainments have qualified them to submit to the ordeal, but the stimulus is more really wanted for those who are below them, who know but little, and for that reason care less. The youth who can scarcely read, or at best very imperfectly, may be told of the benefits which many have derived from the Society's Certificates, but to them the attainment of such a passport to social advancement seems almost hopeless, and the attempt is rarely made. By the Elementary Examinations, however, the chance of success is brought more within the bounds of probability, and for that reason made more truly operative. The certificate being headed, "In connection with the Society of Arts," has a recognised national value, and is thereby made desirable of acquisition, as the stamp of approval for so much having been effected, while it is still more valuable as being the preparatory step to the further Examination which tests the proficiency in certain definite branches of study. It offers the most promising mode of extending the influence and efficiency of that admirable system which has already accomplished so much good. The Society of Arts has commenced the work of offering practical benefits to the members of Mechanics' Institutes, and it should be the object of such Institutes to give the Society full employment.

In this great county the Yorkshire Union of Mechanics' Institutes has sent large bills to all the Institutes, announcing both the Elementary and the Society of Arts' Examinations, giving the several subjects, the time tables, the conditions, and all necessary information, with a request that they should be exhibited in the reading and class rooms; and the West Riding Educational Board has offered to even the smallest Institute, where a responsible person will undertake to superintend the working of the papers, to have them examined and to award the certificates. A similar duty might be undertaken in other districts, if only a few willing and energetic men would devote a little time to the task. The West Riding Educational Board forms a permanent organisation for conducting Examinations, and has been the means of having held in Leeds those of the three principal Universities, the Society of Arts, the Department of Science and Art, and the Elementary. By such an organisation most of the above have been rendered practicable, and it is no little credit to the capital of the West Riding that her fame, which had been hitherto confined to her productions in

wool and iron, is now not less distinguished for the numerous educational agencies in which she has taken the lead.

If in some of the great centres where the Society of Arts' Examinations are now held, permanent Local Committees were formed for conducting all Examinations, some additional means might be taken to extend still wider the benefits of the Elementary Examinations, and render them more generally available. In vain will many strive to deserve the honours if no attempts be made by those who alone have the power to bring them within their reach, and this duty will not be very onerous, nor involve a large expenditure of time and money. Every Institute in union with the Society of Arts may by its committee establish a Local Board for Examinations, and those who are already familiar with the duties, as already applied to the more advanced students, have but to do a little more, and by the adoption of the scheme of Elementary Examinations, bring a far greater number within their influence.

The propriety of giving prizes in addition to certificates is one of those questions which may never be satisfactorily settled, there being much to be said on both sides. Where, however, prizes are given, they should be purely local and not altogether dependent on the certificates obtained. The latter should be prominently put forward as the true object of ambition, and the prize offered as a special recognition of proficiency in some definite subject. For the Society's prizes the competition is with the whole kingdom, but local prizes would, by the competition being brought within a limited area, be more attainable, and therefore more effectual as a stimulus to exertion.

I am, &c.,

BARNETT BLAKE.

Leeds, 20th October, 1862.

MEETINGS FOR THE ENSUING WEEK.

- Mon. ...R. Geographical, 8½. "Latest Explorations in Australia, by Landsborough, Walker, McKinlay, Howitt, &c."
Medical, 8½. Mr. Henry Smith, "The Treatment of certain forms of Hemorrhoidal Tumour and Prolapsus, with the description of a New Clamp."
Tues. ...Syro-Egyptian, 7½. Mr. Samuel Sharpe, "On some Passages in the Old Testament relating to Egypt."
Zoological, 9.
Civil Engineers, 8. Opening Meeting. Mr. R. Crawford, "The Railway System of Germany."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, October 24th, 1862.]

Dated 11th October, 1862.

2747. T. Bouch, Edinburgh—Imp. in machinery or apparatus for charging or filling cartridges.
2748. A. V. Newton, 66, Chancery-lane—Imp. in evaporating apparatus applicable for the manufacture of sugar. (A com.)
2749. A. V. Newton, 66, Chancery-lane—Imp. in sewing machines. (A com.)
2750. S. Chatwood, Bolton—Imp. in and connected with fire and thief proof depositories, and locks or fasteners connected therewith, parts of which improvements are also applicable to other purposes of security.
2751. G. Harvey and A. Harvey, jun.—Imp. in boring machinery.
2753. G. Haseltine, 100, Fleet-street—Imp. in "jacks" and screw nuts for attaching thills and poles of waggons and other vehicles to the axletrees of the same. (A com.)
2754. C. McCarthy, New York—Imp. in automatic safety valves.
2755. W. Loeder, 1, New Broad-street—An improved projectile to be used with ordnance of any calibre. (A com.)
2756. C. Thomas, Bristol—Imp. in the manufacture of silicate of soda, or silicate of potash, and in the manufacture of artificial stone.
2758. J. Gambley, Llantrissant, Glamorganshire—An improved break for vehicles travelling on common roads.
2759. A. I. Mahon, 25, Leinster-square, Rathmines, Dublin—Imp. in propellers and paddle floats, also applicable to the raising and forcing of water or other fluids.

Dated 14th October, 1862.

2761. S. Smith, 204, High Holborn—Imp. in kettles, saucepans, and boilers for domestic or other purposes.
2762. F. G. Grice, West Bromwich—An imp. or imps. in the manufacture of nuts for screwed bolts, and in machinery to be employed in the said manufacture.

2763. E. Suckow and E. Habel, Manchester—Certain imp. in machinery or apparatus for preparing, spinning, and doubling cotton and other fibrous materials.
2764. H. Bridson and J. Alcock, Bolton-le-Moors—Imp. in machinery for folding, measuring, and hooking woven fabrics.
2765. E. Barlow, J. Clough, and F. Hamilton, Bolton-le-Moors—Certain imp. in machinery for driving cotton gins, and for preparing and combing cotton and other fibrous substances.
2767. C. Harratt, Hornsey-lane, Highgate—Imp. in ships' masts.
2768. D. Reid and C. J. Reid, Grey-street, Newcastle-upon-Tyne—Imp. in the manufacture of cases for watches and other pocket timekeepers.
2769. M. Cartwright, Hoxton—Imp. in plates for artificial teeth.
2770. R. A. Brooman, 166, Fleet-street—Imp. in apparatus for carburetting gas. (A com.)
2771. R. A. Brooman, 166, Fleet-street—Imp. in dressing millstones, and in materials employed therein. (A com.)
2772. E. H. C. Monckton, 5, Thurloe-place, South Kensington—Imp. in coils of induction, and in obtaining and applying power by means of electro-magnetism.
2773. O. J. Showell and J. Showell, Manchester—Imp. in the construction of glass roofs and roof lights.
2775. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in sewing machines. (A com.)

[From Gazette, October 31st, 1862.]

Dated 25th July, 1862.

2110. H. A. Jowett, Sawley, Derbyshire—Imp. in obtaining motive power, and in transmitting the same from place to place, and in apparatus connected therewith.

Dated 11th September, 1862.

2500. J. Hemsley, Melbourne, Derbyshire—An improved fabric or material for scarfs, ties, handkerchiefs, and neckerchiefs.

Dated 18th September, 1862.

2556. L. Mond, 38 Sidney street, Brompton—An improved method of obtaining hypo-nitric acid and nitric acid from nitrate of soda.

Dated 13th October, 1862.

2752. A. F. Gallis, 71, Dean street, Soho—A new method of covering street omnibuses and vehicles of every description, for the purpose of sheltering passengers travelling on the top of the same.

Dated 15th October, 1862.

2779. J. Taylor, Oldham—Imp. in temples for looms.
2781. C. De Bergue, Strangeways' Works, Manchester—Imp. in the permanent way of railways.
2782. W. Pope, Cornwall-road, Lambeth—Imp. in coating the sides of ships, batteries, forts, or other places with defensive armour plates.
2783. P. Potenza, Naples—The extraction, preparation, and spinning of the silky fibre contained in the bark of mulberry trees, and the manufacture of the same into textile fabrics.
2784. J. B. G. M. F. Piret, 29, Boulevard St. Martin, Paris—Imp. in lubricating apparatus.
2785. F. F. Prud'homme, 51, Rue de Malt, Paris—Imp. in machinery or apparatus for raising water.
2786. J. Bapty, Leeds—Imp. in apparatus for preparing wool and other fibrous materials.
2787. R. A. Brooman, 166, Fleet-street—Imp. in felting machines, applicable also to the fulling, scouring, and dressing of pure and mixed woollen stuffs. (A com.)
2789. E. A. Cowper, No. 35A, Great George-street, Westminster—Imp. in steam engines.

Dated 16th October, 1862.

2790. W. Barningham, Pendleton Iron Works, Manchester—Imp. in the permanent way of railways.
2792. G. T. H. Pattison, Glasgow—Imp. in machinery or apparatus for embossing or finishing woven fabrics.
2793. G. T. H. Pattison, Glasgow—The imparting of an improved surface or appearance to fabrics woven with mixed materials.
2794. H. A. Rémère, 52, Rue de l'Arbre-sec, Paris—An improved horse collar.
2796. T. G. Harold, Brooklyn, U.S.—Imp. in locks.
2797. E. Humphrys, Deptford, Kent—Imp. in steering apparatus.
2798. H. Ransford, Huron-lodge, West Brompton—Imp. in building ships and other vessels.
2799. J. Cash and J. Cash, jun., Coventry—An imp. in the manufacture of valentines.
2800. J. Robinson, East India-road—Imp. in protecting the submerged portions of iron ships, and in ventilating the cabins and cabin decks in iron ships.
2801. H. Hely, jun., Merchants-quay, Dublin, and C. Mills, Dublin—Imp. in envelopes.

Dated 17th October, 1862.

2805. J. Davies and G. Davies, Tipton, Staffordshire—Imp. in rotary engines, rotary pumps, and rotary blowing machines.

2806. W. S. Kennedy, Queen's-road, Bayswater—An improved method of and apparatus for, applying fomentations and other external remedies to the throat.
2807. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of iron and steel. (A com.)
2808. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in the prevention or removal of incrustation in or from steam generators. (A com.)

INVENTION WITH COMPLETE SPECIFICATION FILED.

2872. J. Carpendale, Meadow-street, Sheffield—Imp. in the means of producing raised chasing on Britannia and other compressible metals.—25th October, 1862.

PATENTS SEALED.

[From Gazette, October 31st, 1862.]

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| October 31st. | 1355. J. E. Ransome, W. Cop-ping, and L. Landsell. |
| 1287. J. Swallow and J. Allinson. | 1358. E. Bourdon. |
| 1289. C. P. A. Douchain. | 1359. C. V. F. De Berville. |
| 1291. W. Huntingdon and T. Huntingdon. | 1365. J. Johnson & A. Chapman. |
| 1299. R. A. Brooman. | 1367. R. A. Brooman. |
| 1300. C. F. Whitworth. | 1368. J. Combe. |
| 1301. M. Paul. | 1369. G. T. Bousfield. |
| 1307. H. Juhel. | 1372. D. Marchal and A. C. De Wiart. |
| 1309. E. Ormerod and C. Schiele. | 1373. J. McCann. |
| 1311. J. M. Herdevin and J. A. Jullien. | 1382. G. C. Grimes. |
| 1312. T. Snowden. | 1385. L. de la Peyrouse. |
| 1314. E. Herdman, A. F. Herdman and J. Herdman. | 1389. L. D'Aubreville. |
| 1321. J. Mellowdew, T. Mellowdew, and C. W. Kesselmeier. | 1390. T. K. Mace. |
| 1323. J. Heyworth. | 1400. G. C. Haseler. |
| 1325. A. Williams. | 1440. J. H. Johnson. |
| 1327. L. G. Perreux. | 1443. W. Clark. |
| 1331. T. F. R. Brindley. | 1455. H. Deacon. |
| 1335. R. Burley. | 1461. A. Nicole. |
| 1337. J. Roscoe. | 1466. J. P. Jouvin. |
| 1341. J. Adcock. | 1467. J. Dickier. |
| 1344. R. Mills. | 1484. A. A. Lamiable. |
| 1345. A. Morel. | 1492. F. Stocken. |
| 1347. P. Chenaillier. | 1598. J. Simpson. |
| 1348. J. Clarke & J. Richmond. | 1607. J. H. Johnson. |
| 1349. W. Richard & J. Richard. | 1624. F. Datchy and E. Sabatier. |
| 1351. W. Greaves. | 1699. P. M. Parsons. |
| 1353. W. Clark. | 1883. C. Cochran. |
| | 2176. W. E. Newton. |
| | 2328. C. Callebaut. |
| | 2380. W. E. Newton. |

[From Gazette, November 4th, 1862]

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| November 4th. | 1535. A. Giles. |
| 1378. W. Southwood. | 1547. A. B. Childs. |
| 1381. C. Lungey. | 1574. J. A. C. N. Delpech. |
| 1394. T. Fawcett. | 1594. G. H. Daw. |
| 1398. F. F. Bolton. | 1801. W. E. Newton. |
| 1399. F. J. Bolton. | 1955. J. Kidd. |
| 1412. J. D. Christofini. | 2172. J. Ransom and E. Ransom. |
| 1414. H. W. Sambridge. | 2174. G. T. Bousfield. |
| 1432. S. B. Ardrey & S. Beckett. | 2412. J. G. N. Alleyne and J. Roberts. |
| 1438. A. Wormull. | 2413. J. Nickson and T. Waddingham. |
| 1448. R. M. Latham. | 2526. A. V. Newton. |
| 1480. G. Haseltine. | |
| 1488. G. Davies. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, November 4th, 1862.]

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|----------------------|----------------------|
| October 28th. | October 30th. |
| 2478. I. Brown. | 2503. C. W. Siemens. |
| October 29th. | October 31st. |
| 2483. R. A. Brooman. | 2491. J. Jones. |
| 2487. L. Pohl. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, November 4th, 1862.]

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| October 27th. | October 29th. |
| 2427. H. E. Drayson. | 2430. T. S. Grimwade. |
| 2451. R. Cook. | October 30th. |
| October 28th. | 2450. J. Patterson. |
| 2414. W. Hartley. | October 31st. |
| 2419. W. Naylor. | 2452. W. Staufen. |
| | 2484. T. Thomas. |

LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Name.	Address.
4519	Oct. 30	Searf Ring	Simon Greenberg	Birmingham.
4520	„ 31	Blanch's Improved Compound Rifle Sight	William Harnett Blanch	Liverpool.
4521	Nov. 4	Egg Cup and Cover	William Spurrier	Birmingham.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 14, 1862.

NOTICE TO MEMBERS.

The One-Hundred-and-Ninth Session of the Society will commence on Wednesday, the 19th November, at 8 o'clock, when Sir THOMAS PHILLIPS, F.G.S., Chairman of the Council, will deliver the Opening Address. The Chair will be taken at Eight o'clock on the following Wednesday Evenings:—

1862. November	—	—	19	26	
„ December	3	10	17	—	—
1863. January	—	14	21	28	
„ February	4	11	18	25	
„ March	4	11	18	25	
„ April	—	8	15	22	29
„ May	6	13	20	27	
„ June	—	—	—	24*	

For the Meetings previous to Christmas, the following arrangements have been made:—

NOVEMBER 19.—Opening Address by Sir THOMAS PHILLIPS, F.G.S., Chairman of the Council.

* * * On this evening the Medals which were awarded by the Council for Papers read at the Weekly Evening Meetings during the last Session, will be distributed.

NOVEMBER 26.—“On the Utilization of Peat, with reference more particularly to the Manufacture of Hydro-Carbon Oils.” By B. H. PAUL, Ph.D.

DECEMBER 3.—“On Thompson’s Process of Boatbuilding by Machinery.” By D. PUSELEY. Illustrated by Models.

DECEMBER 10.—“On the Construction of Labourers’ Cottages and Sanitary Building Appliances.” By JOHN TAYLOR, Jun., Architect. On this evening Major-General Tremenhare will preside.

DECEMBER 17.—“On the Mines and Minerals of the United Kingdom.” By ROBERT HUNT, F.R.S., Keeper of Mining Records, Government School of Mines.

GENERAL INDEX.

A general Index to the first ten volumes of the *Journal* will shortly be published, which should be bound with the present volume. Members who desire to have copies are requested to apply to the Secretary before the 1st of December, in order that a sufficient number may be printed.

NOTICE TO INSTITUTIONS.

A limited number of copies of a pamphlet, by Mr. Henry Roberts, F.R.I.B.A., “On the Essentials of a Healthy Dwelling, and the Extension of its Benefits to the Labouring Population, with a Special Reference to the Promotion of that Object by H.R.H. the late Prince Consort,” has been placed at the disposal of the Council for distribution amongst the Institutions in Union. Any Institution desiring to have a copy should apply to the Secretary.

INTERNATIONAL EXHIBITION OF 1862.

REPORTS OF THE JURIES.

The Reports will be published in super royal octavo, to range with the one-volume Jury Reports of 1851. The price of the volume, bound in cloth, to Members of the Society of Arts, to Jurors, and Guarantors, is fixed at 10s. ; to other persons, 15s. If bound in morocco, 7s. 6d. additional in each case.

The reports of each class are sold separately ; for prices see advertisement.

INTERNATIONAL EXHIBITIONS.

The following letter has been addressed to the Secretary of the Society of Arts:—

SIR,—The queries proposed by the Society of Arts to the jurors, foreign and colonial commissioners, and principal exhibitors, at the International Exhibition, to elicit their opinions whether, in future International Exhibitions, the present system of awarding “medals” and “honourable mentions” should be abandoned, with or without a substitute, or should be maintained with or without alteration, were received by me, a juror of Class 29, “Educational Works and Appliances;” but I found it impossible to express, in that categorical form, an intelligible statement of my opinion.

I am of opinion that radical changes, extending far beyond the constitution, procedure, and awards of juries, must be agreed on before an International Exhibition can again be held with any fair chance of success; and in this letter I will endeavour to sketch out a few of the changes which appear to me to be necessary.

Before the Great Exhibition of 1851 was held, its authors—His Royal Highness the Prince Consort and the Society of Arts—announced that it was designed to be the first of a series of International Exhibitions to be held in London every fifth year; and her Majesty’s Commissioners for that Exhibition held out public expectations that, if any surplus funds should be realised at its close, they would be available for the intended future Exhibitions. On this understanding, a sum of more than seventy thousand pounds was received from the public in voluntary subscriptions, and the Exhibition was held with enthusiastic popularity, and an amazing financial success.

The surplus actually realised—£186,436 18s. 6d.—was, however, so very much larger than anyone had anticipated as possible, that it seemed ridiculous to apprehend that a future Exhibition might find its expenditure greater than its receipts; and the advantages of resting such a popular undertaking in future entirely on voluntary support, rather than on an endowment, were thought to be so overpowering, that her Majesty’s Commissioners, notwithstanding their previous announcements, thought it right to obtain a supplementary charter, which authorised them to apply their surplus to the promotion of Industrial Instruction, and they invested the whole sum together with a grant of (I think) £175,500 from Parliament in the purchase of the South Kensington estate.

Looking back upon these transactions, and fully admitting that the Commissioners were justified at that time in taking powers to apply their surplus to an object not contemplated at first, one cannot doubt that, in equity, the first claim upon that estate is now for such assistance to future International Exhibitions as may be necessary in order to their being held; and that no scheme of industrial instruction, however excellent and urgently required, should be aided by the Commissioners of 1851

* The Annual General Meeting: the Chair will be taken at Four o'clock. No Visitors are admitted to this Meeting.

until the original claim for periodical exhibitions shall have been satisfied in full.

This opinion is widely entertained; and that the Commissioners of 1851 themselves regard their property as still applicable to the purposes of International Exhibitions is certainly to be inferred from their free grant of the present site to the uses of the Commissioners of 1862.

The question, then, to be immediately decided, is whether there is now any necessity for assistance from the commissioners of 1851 toward the establishment of periodical International Exhibitions: and this question cannot be answered in the negative.

The preservation of the existing building, which stands on their estate, is a necessary condition of future exhibitions; for, if that building be destroyed, it is idle to expect that a body of guarantors will again be found to incur the responsibility of providing funds for a new structure; or that a competent body of commissioners will again be found willing to accept the responsibilities which have been undertaken by Lord Granville and his colleagues, the Commissioners of 1862.

The building has cost (say) £400,000; it stands on the only possible site of future exhibitions, and is admirably suited for them; and yet no one is in a position to assure us that this costly structure will not be pulled to pieces in a few weeks, and sold as "old materials." We have heard of people stultifying themselves, but when did mortal ears hear of such a self-idiotification as will be effected by the people of this country if this wanton and extravagant destruction is perpetrated?

Let us understand the case. What are the circumstances that make this catastrophe possible? Pecuniary means are wanting to complete the building for permanent use, and to maintain it in repair till the next International Exhibition is held.

Apart from the ornamentation of the outside of the building, which may be effected gradually, according to existing plans, a sum of £100,000 may be necessary to complete it without the annexes. Assuming, what I shall presently examine, that this sum might be raised on the South Kensington estate, the point to be ascertained is whether we can agree upon a self-supporting plan for the use of the building in the intervals between one International Exhibition and another; for the Commissioners of 1851 cannot be expected to devote their trust funds to the completion of the building if it is only to be used during each tenth year, and is to be a costly inutility during all the intervening periods of nine years.

There has been a good deal of controversy respecting the length of interval that ought to occur between one exhibition and another. The original proposal was for five years. The French have held their great exhibitions generally about once in five or six years. Their last was held in 1855; and it has been stated that it was the Emperor's intention to have another in 1861 or 1862; but that he postponed it, to avoid interfering with ours. The Society of Arts has recently suggested ten years; and many persons are of opinion that the period ought to be considerably longer.

Now, surely, the existing exhibition itself demonstrates by its enormous extent, and great intrinsic superiority to its predecessors of London and Paris, that it was not held one day too soon. It is evident that, if it had been postponed but for a few years, its increase in size above its prototype of 1851 would have been so enormous, that no site in this metropolis could have contained it, no set of men could have managed it, and no one could have understood one half of it; and very many admirable improvements upon what was excellent in 1851 would have been unduly kept back from the knowledge and use of the world. As it is, does not every one feel that the Exhibition has been too big for the place, too large and unwieldy for the management of the Commissioners, for the eyes, understandings, and memories of the visitors, for the means of access, and for the roads and streets? Such a monster exhibition is generally felt to be too great a dis-

turbance of the normal habits of London to be repeated at very brief intervals; and yet, if the intervals be not very brief, its size, its excitements, its disturbing powers, when it occurs, and the difficulties of managing it, are immensely aggravated. From these considerations it seems to me that there is only one sound conclusion, viz., that in future we should have smaller exhibitions at shorter intervals.

That which is done only once in ten years is not likely to be done very well. The management of International Exhibitions is an undertaking of singular difficulty, in which experience, always valuable, is of especial value; but, when they occur at long intervals, with no intervening links of continuance, experienced officers cannot be found to undertake the management. A heterogeneous staff is therefore suddenly recruited from all parts of the world. Men, yesterday strangers, are to to-day brought into close and confidential relations; none knows his colleagues, his own place, or duties. Everything is hurried, and consequently there are much confusion, mismanagement, and profusion of expense. In like manner the "national" and "trade" "committees of advice," the colonial commissions, and the juries, are suddenly created in a haphazard fashion, and called upon to discharge unaccustomed duties of great difficulty and delicacy. They hastily grope their way to a knowledge of what is expected of them; as soon as the Exhibition is opened, the committees are superseded by the juries, and they, in their turn, after a brief interval, as soon as they have hastily made their awards, are disbanded without ceremony. There is no continuity between one Exhibition and another. The collections of the United Kingdom are exhibited without a sufficient selection and sifting; and, consequently, the rubbish which we exhibit is proportionately greater than the rubbish of foreign countries and the colonies, whose collections are generally selected with much care and skill. We want a better organisation.

Probably our two great Exhibitions of 1851 and 1862 were as well organised as the circumstances under which they were held would allow; but they partook sadly of the character of chaos; they were gigantic enterprises of Titanic force, admirable in the infancy of International Exhibitions, but unsuitable to their mature state. It will be inexcusable if a third time the whole of the arrangements are made spasmodically in a hurry.

Much smaller Exhibitions, of objects carefully selected on the sole ground of their having merit, at shorter intervals than ten years, and with links of continuance in the intervals, would be far more conducive to the interests of Arts, Manufactures, and Commerce; and I will state briefly some of the conditions under which, it appears to me, that such Exhibitions might, with advantage, be maintained.

Let us have done with chaos and let order appear. Let us have done with temporary buildings erected in haste, temporary commissions appointed at the eleventh hour, ephemeral committees and juries, officers "of sorts" brought together by tuck of drum.

We want (1st) in London a permanent Central Body, having branches in the great seats of industry. Let us call this permanent body—

"THE ALBERT INSTITUTE OF EXHIBITIONS, NATIONAL AND INTERNATIONAL."

This Institute and its branches might be established under the authority of the Crown by a Royal Charter, or under the authority of Parliament.

The central Institute might be a representative body, consisting of:—

The First Lord of the Treasury, the Lord President of the Council, the President and the Vice-President of the Board of Trade.

The Commissioners of 1851 and 1862.

The President and the Chairman of the Council of the Society of Arts. (The Society which originated the Exhibitions of 1851 and 1862, and which ob-

tained the Charter of Incorporation under which the Exhibition of 1862 is held.)

The Mayors of the United Kingdom.

The Presidents of the Chambers of Commerce.

The Presidents of Scientific Societies.

The Chairmen of all Local or Branch Boards for Exhibitions.

Representatives of organised industries.

Representatives of the Universities.

Representatives of the Colonies.

With power to add to themselves a limited number of experts; and to appoint an Executive Committee and such other committees as may be expedient.

We want (2nd) throughout the United Kingdom, permanent Local Bodies, Branches of the Institute—let us call them—

“THE ALBERT INSTITUTE—BRANCH.”

The duties of the Central Institute would be:—

- (a). To maintain perpetually Exhibitions in their building at South Kensington. These Exhibitions would be various, of a special character, and limited extent; some held only for a few months, others perhaps during the whole interval between one International Exhibition and another. I need not particularise these minor Exhibitions, for every one who is familiar with these matters is aware that there are an almost infinite number of subjects connected with various branches of Arts, Manufactures and Commerce, which want to be illustrated more fully than is possible in a great International Exhibition.
- (b). To co-operate with the various Branches of the Institute in organising occasional or periodical Local Exhibitions of Arts and Manufactures in the great towns and seats of industry.
- (c). To promote and superintend the due representation of the industries of the United Kingdom and the Colonies in all International Exhibitions held in foreign countries; and
- (d). To hold our own International Exhibitions when our own turn comes round.

The duties of the Branch Institutes would be:—

- (a). To co-operate with the Central Institute in selecting objects for the Special Exhibitions.
- (b). To organise and manage their own Local Exhibitions.
- (c). To promote the due representation of the industries of their own localities in International Exhibitions held in foreign countries; and
- (d). To perform the duties of the “National” and “Trade” Committees of Advice, in reference to our own International Exhibitions.

The Institute might appoint a standing body of Jurors, including experts, representatives of each of the classes into which our future International Exhibitions are to be divided. These jurors would be paid by fees for their work done; and, being a permanent body, accustomed to act together according to known rules, and practised in their duties, might be trusted to pronounce judgments and to award medals for objects of special excellence.

Assuming that a great International Exhibition might be held every alternate year, either in England, or in France, or in Germany, in regular rotation, there would be one in London every sixth year; and there would be a variety of minor exhibitions throughout the intervening five years.

A permanent staff, of moderate extent, would, therefore, be constantly employed by the Institute; and its officers, becoming experienced in the constant management of exhibitions, and being reinforced, when necessary, by some of the similarly experienced officers of the Branch Institutes would be an admirable nucleus for the much larger establishments which would be requisite when the International Exhibitions came round.

These Great Exhibitions, the “applications for space”

being carefully sifted by the Branch Institutes under rules laid down by the Central Institute, might be confined within limits very much smaller than those of 1862.

The annexes being relinquished, and the space for refreshments and for passages being considerably enlarged, the remainder of the present building would be the available area; and into this area nothing whatever should be admitted which it would not be for the real interests of Arts, Manufactures, and Commerce that the public should have so special an opportunity to see.

The powers granted under her Majesty's charter to the commissioners for the existing Exhibition will expire when its affairs are wound up. The Commissioners of 1851 are so far a permanent body that they are charged with the application of the surplus of that year's Exhibition; and it is invested in the South Kensington estate, a permanent property, which must give rise to perpetual duties. Though this commission, however, is composed of eminent persons of high character and ability, whose co-operation would be exceedingly valuable, they could not undertake themselves to manage such an Institute as I have sketched; their functions would naturally and necessarily be merged in the representative body, the Albert Institute; and the South Kensington estate, purchased with the proceeds of the first International Exhibition, and therefore equitably subject to a charge for the wants of future International Exhibitions, would become the property of the Institute, and available for its objects.

I cannot pretend to give a clear view of the financial history and state of that property. It cost £327,000 about ten years ago.

The surplus of 1851 was stated to be £186,436 18s. 6d.; and the Commissioners received a parliamentary grant of about £170,000. The parliamentary grant was repaid partly in land, the site of the South Kensington Museum, which was transferred to the Committee of Council on Education, and partly in cash. The estate remaining with the Commissioners must now be worth a very much larger sum than £327,000. It has been completely “formed;” the roads and the sewers have been made; some hundreds of magnificent houses have been built; and the Horticultural Garden has been placed there. The estate is understood to be heavily mortgaged, but large portions remain to be built upon; and, if these could at once be realised, at their full value, there would certainly be more than sufficient funds with which the Exhibition building might be put into a condition suitable for permanent use, except mere ornamentation, which might be done by degrees.

In connection with this question of the immediate realisation of funds by dealing at once with the unappropriated land, the other questions which I have raised respecting the character and periodical recurrence of future Exhibitions are of the greatest moment.

If we are to have decennial repetitions of this year's enormous Exhibition, with its accompanying crowds, confusions, hubbubs, and blockades, and if during the intervening periods of nine years the building is to contain nothing attractive to the inhabitants of the neighbouring houses, we must expect not a rapid improvement, but a rapid depreciation, of the South Kensington property. But, if it were determined that the future Exhibitions should be reduced to manageable proportions, that the unsightly annexes should be removed, that the main building, at present unfinished, a mere carcass, should be completed with the ornamentation proposed, that suitable means of access should be provided so as to prevent the recurrence of blockades, and that exhibitions of interest and utility should constantly be held in the building, the value of the whole estate would be at once greatly augmented, and the impetus given to the application of the property to the purposes of building would be sufficient to raise its value to the point necessary for obtaining the one hundred thousand pounds which I have assumed to be immediately required.

The site of the western annexe and those portions of

the estate which connect that site with the Kensington-road, and those portions of the estate abutting on that road, which are not required for the proposed memorial "Albert Hall," might at once be disposed of for the building of houses of the very finest character that the metropolis can boast.

The value of the eastern annexe might also be realised in a manner that would add incalculably to the value of the whole neighbourhood. What is the great want of west London on the north and south sides of Hyde-park? A direct communication across the park. What incidents of the present Great Exhibition are most calculated to deteriorate the value of the adjoining property? The noise and confusion and blockading of the streets. This want would be supplied, and the causes of deterioration would be removed, if the site of the eastern annexe and the corresponding portion of the garden of Eden-lodge were sold to a railway company, who should make an underground railway from the Exhibition Building to the nearest point of the Metropolitan Underground Railway on the north side of the park; and if that company (paying in money for the site of the eastern annexe and the garden of Eden-lodge) should pay for the privilege of tunnelling under Hyde-park (not in money but in money's worth) by the construction of the much wanted sunken road for carriages along the line of the wall of Kensington-gardens, from the Bayswater-road to the Kensington-road. The railway would have its station at the road level, between the present entrances to the Exhibition and the Horticultural-garden in the Exhibition-road; and this station would give access to the Exhibition and the Garden, and also (by an arch or a tunnel) to the western entrance of the South Kensington Museum. The railroad would dip under the annexe, under the garden of Eden-lodge, under the Kensington-road, and would pass under Hyde-park from south to north; and, as there would be neither smoke, nor steam, nor screams, the advantages of the communication by railway would be the greatest possible—and the disadvantages would be *nil*.

A branch of the Underground Railway ought also to be carried from west to east, under Hyde-park, under Hyde-park corner, under the Green-park, and under St. James's-park to Westminster.

It may be said that permission to carry a railway under Hyde-park has been already asked and refused. It may be so; and, while underground railways were still in the regions of theory, it was natural that such a request should be refused, but now that an underground railway has been received into the region of facts accomplished, we may be sure that public opinion will insist upon the adoption of this method of utilising the parks. An underground railway will interfere in no degree with their beauty and utility as parks, while it will afford a most effectual relief to the crowded thoroughfares in their neighbourhood.

By thus providing abundant access to the houses on the estate, to the Exhibition building, to the Horticultural garden, and to the South Kensington Museum, without crowds, confusion, or noise, an immense impetus would be given to the realisation of the property; and, if a sum sufficient for the initial expenses could not be thus entirely raised without loss of time, the balance might be procured on the security of the estate, either by a Parliamentary Loan, or by Debentures, or by a guarantee fund. All that would be necessary would be to provide for the initial expenses; because the proceeds of the special exhibitions held in every ordinary year in the building would be amply sufficient for the expenditure of ordinary years; and in each extraordinary year, when the Great International Exhibition was held, the cost of the building having been already defrayed, there must necessarily be a large surplus from the receipts, and this surplus would be available for the final extinction of the debt, for the ornamentation of the building, and, finally, for some well considered scheme of "Industrial Instruction,"

in accordance with the supplementary charter already alluded to.

The interests of Arts, Manufactures, and Commerce, the memory of our great Prince, and the honour of the country, forbid our entertaining the thought that we shall have no more International Exhibitions in London. In this letter I have endeavoured to direct attention to some of the conditions which seem to me to be necessary to enable us to have them.

I do not propose this scheme as a substitute for the intended National Memorial to the ever-memorable Prince, whose removal from this world we can never cease for ourselves to regret; but it is a scheme for a truly national memorial of him, and I venture to think such a memorial as he might have approved.

I am, &c.,

HARRY CHESTER.

63, Rutland-gate, London,
October 24, 1862.

DOUBLE SCREW STEAMERS.

It will be remembered that a paper "On Constructing and Manœuvring Screw Steamers," by Commander T. E. Symonds, R.N., was published in the *Journal* for the 25th July last, page 563. This paper was read at a meeting of the United Service Institution, and pointed out the advantages to be derived by the application of double screws under the quarters of a vessel. The new iron-clad navy of the Federal States is said to number amongst its vessels many thus fitted, this arrangement enabling the hull of the vessel itself to be turned in any required direction with rapidity and ease.

Mr. Dudgeon, the engineer and shipbuilder, has been the first to give a practical illustration of the advantages possessed by two screw propellers over a single one. The *Flora*, of 400 tons, double screw propeller, was built at Blackwall, from designs by Mr. Dudgeon, and on Friday, the 7th inst., an official trial of her speed and capabilities of manœuvring took place upon the river between Tilbury and the Mouse Light. Shortly before twelve o'clock she left Tilbury-wharf, having on board Mr. Dinan, R.N., Admiralty Inspector of Steam Machinery; Commander Symonds, R.N.; Captain Selwyn, R.N., inventor of the cylindrical system of laying the transatlantic telegraph cable; Captain Crookshank, Mr. Dudgeon, Mr. W. Dudgeon, and a party of officers in the naval service and mercantile marine, as well as many well-known yachtsmen; also several gentlemen connected with her Majesty's dockyards, and with the Swedish and Russian marine.

The dimensions of the *Flora* are as follows:—Length in load line, 150ft.; beam, 22ft. 6in.; depth in hold, 13ft. 6in.; nominal horse-power, 120; indicated horse-power, 400; two screws of three blades each, 7ft. in diameter, and having a pitch of 14ft. 6in.

On the day of trial she drew 7ft. water aft and 5ft. 5in. forward. Her displacement was 350 tons, and the area of immersed midships section 120 feet. She is rigged as a fore and aft polacca-masted schooner; her masts fitted with joints near the deck, so that they can be lowered down should occasion require it; she is also fitted with a telescope funnel.

Immediately after leaving Tilbury-wharf her commander put her obedience to the helm to a severe test by steering a course in the form of the letter S through a fleet of shipping that lay at anchor off Gravesend, and the manner in which she steered was most satisfactory. She then proceeded at moderate speed to the Nore Light, working at 15lb. pressure, at a speed to the vessel of 10·6 knots, of the screw 14·5, with two knots of flood tide against her, and an estimated slip of two knots—making an average of 12 knots an hour.

She was abreast of the Nore at 1h. 55m. 25s., just at high water, and then proceeded on her trial to the Mouse Light-vessel, 7½ nautical miles distant. In the middle of the trial she was working at 18lb. pressure, and the screws making 106 revolutions per minute; her engines,

also made by Mr. Dudgeon, worked beautifully. The Mouse Light was reached at 2h. 27m. 6s., exactly in 31 minutes 43 seconds. She left the Mouse Light for the Nore at 2h. 29m. 28s., and reached the latter at 3h. 18m. 40s.; she was 15 minutes detained on this passage by the port engine bearing getting heated, which would leave her passage up, against the first of ebb, at 34 minutes; an average of 14 nautical miles per hour from a new vessel.

After leaving the Nore, on her passage up the river, Mr. Dinen subjected her to the following trials:—1st trial. Turning ahead with both engines full speed, then taking a bearing from the shore, putting the helm hard over, and noting the time she took to describe a circle—three trials. Mean time occupied in describing the circle, 3 minutes 13 seconds. 2nd trial.—Keeping a course of full speed, then easing and stopping one screw, keeping the other at full speed, the helm then being put hard over to note the time she took in describing a circle. Time occupied, 3 minutes 26 seconds. 3rd trial.—On a course at full speed, then backing one screw astern full speed, keeping the other at full speed ahead, with the helm hard over to see what time she would take in describing a circle. Time occupied, 2 minutes 34 seconds. 4th trial.—Stopping both engines and screws; starting from a state of rest; turning one screw ahead full speed and the other screw astern full speed, noting the time she took to describe a circle. Time occupied, 4 minutes 2 seconds. In this last trial she turned on her own centre in a manner that excited much astonishment.

MEETINGS FOR THE ENSUING WEEK.

- MON. ...** Medical, 8½. Lettsomian Lecture. James Bird, M.D., "Private Hygiene: Man's Intrinsic Predisposition to Health or Disease; and the Climateric Action of Hygienic Modifiers on the Vitality of his Organism."
Royal Asiatic, 3.
British Architects, 8.
- TUES. ...** Statistical, 8.
Ethnological, 8. 1. Mr. Thomas Wright, "Report on the Ethnological Papers read at the Meeting of the British Association at Cambridge." 2. Captain R. Burton, H.M. Consul at Fernando Po, "Account of a Visit to the Fans." 3. Mr. T. Wright, "On the Human Remains found in the Excavations at Wroxeter."
Civil Engineers, 9. Discussion upon Mr. Crawford's Paper on "The Railway System of Germany."
- WED. ...** Society of Arts, 8. Opening Address by Sir Thomas Phillips, F.G.S., Chairman of the Council.
Geological, 8.
- THURS. ...** Chemical, 8. 1. Mr. G. B. Buckton, "On some Reactions of the Organo-metallic Radicles." 2. Mr. E. Nicholson, "On the Specific Gravity of urine as a measure of its Solid Constituents."
Linnean, 8. 1. Mr. A. Murray, "On the Development of Orthopterous and Hemipterous Insects." 2. Dr. W. C. McIntosh, "On the Hairs of the Shore-crab (*Carcinus Menas*)." 3. Dr. McIntosh, "Notes on the Food and Parasites of the Salmon of the Tay."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

Dated 18th October, 1862.

809. R. Webster, Leeds—Imp. in means or apparatus for preventing or mitigating accidents arising from collisions of railway trains.
2810. E. Lord, Todmorden—Certain imp. in machinery for opening and cleaning cotton and other fibrous substances.
2811. H. Ledger and B. Williamson, Manchester—An improved substitute for tombstones, tablets, monuments, and other similar memorials or commemorative records.
2812. J. Bentley, Denton, Lancashire—Imp. in apparatus for forming and pressing felt hats.
2813. L. Lauth, Reichshoffen, France—Imp. in machinery or apparatus for polishing sheet iron or other metal.
2814. R. A. Brooman, 166, Fleet-street—Imp. in frames for doubling and twisting threads. (A com.)
2815. J. Fuller, Bishopsgate-street—An imp. in treating india rubber used on a wire or wires for insulating the same.
2817. W. Clark, 53, Chancery-lane—Imp. in apparatus for dredging. (A com.)

Dated 20th October, 1862.

2818. J. Tangye, Birmingham—Imp. in, or additions to, certain kinds of pulleys for raising heavy weights.

2820. R. A. Brooman, 166, Fleet-street—Imp. in transferring designs and prints produced by photography to stone or zinc. (A com.)
2824. J. B. Payne, Chard, Somersetshire—Imp. in machinery for the spinning, twisting, and doubling and laying of hemp, fax, and other fibrous substances.
2826. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in apparatus for boiling liquids and cooking or preparing food, applicable also as a night light. (A com.)

Dated 21st October, 1862.

2830. J. Byram, Moldgreen, near Huddersfield—Imp. in lamps for the combustion of paraffin, rock oil, or other oils.
2832. C. G. Clarke, jun., Owthorn, near Hull—Imp. in garden shears.
2834. J. T. Cooke, Leicester—Imp. in battens for weaving.
2836. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of boots and shoes. (A com.)
2838. G. Haseltine, 100, Fleet-street—Imp. in the mode of, and in machinery for manufacturing nails, brads, and other similar articles. (A com.)

[From Gazette, November 7th, 1862.]

Dated 11th July, 1862.

1998. W. Ashton, Manchester—Certain imp. in machinery employed in the manufacture of braids and similar articles, parts of which improvements are also applicable to machinery used in spinning fibrous substances.

Dated 27th August, 1862.

2373. J. A. Coffey, 4, Providence-row, Finsbury-square, and T. Redwood, 19, Montague-street, Russell-square—Imp. in the manufacture of salts of ammonia and other products from the ammoniacal liquors of gas works and animal charcoal works, and in the still or apparatus to be used in such manufacture.

Dated 25th September, 1862.

2611. R. Alexander, Islington, Liverpool—Imp. in mariners' compasses.

Dated 13th October, 1862.

2760. E. B. Wilson, Parliament-street, Westminster—Imp. in apparatus employed in the manufacture of iron and steel.

Dated 15th October, 1862.

2776. E. Molyneux, jun., Meavien Eaniskerry, Wicklow, Ireland—An improved carriage, with a travelling railway attaché.
2778. J. H. Jenkinson, Manchester—Certain imp. in drinking fountains.

Dated 16th October, 1862.

2795. F. Delmas, 9, Cloak-lane—A rain absorber.
2802. E. Nelson, 13, Johnson's-place, Ranelagh-road, Thames-bank—Imp. in the manufacture of apparatus for heating and superheating steam and air without decomposition.

Dated 20th October, 1862.

2819. G. Haseltine, 100, Fleet-street—Imp. in forging cannon and other heavy articles. (A com.)
2821. J. Clark, Buchanan-street, Glasgow—Imp. in the means of applying railway brakes.
2822. N. R. Hall, Rosherville, Northfleet, Kent, and M. L. Parnell, Strand—Imp. in the construction of thermometers.
2823. W. A. Turner, Lawrence Pountney-lane, and T. T. Coughlin, King's-place, Stones'-end, Borough—Imp. in apparatus for measuring cloths and other fabrics, parts of which are also applicable to indicating distances travelled by vehicles.
2825. H. L. Emery, 72, Sloane-street—Imp. in propelling machinery actuated by the application of animal power.

Dated 21st October, 1862.

2828. W. Tristram, Bolton—An improved method of, and apparatus for, preparing and dressing yarns or threads to be employed as warps.
2829. W. H. Tucker, 181, Fleet-street—Imp. in self-closing apparatus for doors.
2831. S. Whitham and T. Wright, Wakefield—Imp. in the manufacture of iron and steel, and in the apparatus employed for that purpose.

2833. C. Clark, 361, City-road—Imp. in cigar tubes, and in cigar and pipe mouth pieces.

2835. R. A. Brooman, 166, Fleet-street—Imp. in waterproofing, and in recovering products employed therein. (A com.)

2837. J. Duke and J. Clever, Puriton, Somersetshire—Imp. in the manufacture of cement.

2839. F. Tolbausen, 17, Faubourg Montmartre, Paris—An improved machine for raising, lowering, removing, and carrying buildings, monuments, and ships or vessels. (A com.)

Dated 22nd October, 1862.

2841. G. Clark, 30, Craven-street, Strand—Imp. in the construction, protection, and armament of ships, vessels, and floating batteries, some of which improvements are applicable to land batteries and forts.

2842. J. Spence, Portsmouth—Imp. in non-conducting compositions for preventing the radiation or transmission of heat or cold, and in coating metallic or other surfaces therewith.

2844. E. Fielding, Willow Bank, near Todmorden—Imp. in the manufacture of hedges, and in the machinery employed therein.

2845. H. Wilde, Manchester—Imp. in electro-magnetic telegraphs.

2846. H. H. Kromschroeder and J. F. G. Kromschroeder, Princess-terrace, Regent's-park—Imp. in the manufacture of gas meters, and in the manufacture of sheet metal suitable for gas meters.

2847. E. W. Hughes, 28, Great George-street, Westminster—Imp. in turn-tables and turn bridges.
 2848. T. Fearn, Birmingham—Imp. in the manufacture of rods, poles, tubes, and other forms employed in the construction of various articles of furniture, and for other similar purposes.
 2849. T. Greenwood, Leeds—Imp. in machinery for preparing to be spun flax, hemp, tow, silk waste, China grass, and other fibrous substances.
 2850. V. Orłowski, Spring-gardens, Worcester—Imp. in motive power carriages.

Dated 23rd October, 1862.

2852. W. S. Gamble, Frederick-street, Caledonian-road, Islington—An improved salinometer.
 2854. J. Turnbull, Barnard Castle, Durham—Imp. in mills for grinding grain.
 2856. E. Bath, Swansea—Imp. in treating alkali waste to obtain sulphur therefrom.
 2858. H. Ree, Hamburg—Imp. in apparatus for exercising the human body.
 2860. E. H. Carbutt and G. A. Clough, Bradford—Imp. in power hammers.
 2862. R. A. Brooman, 166, Fleet-street—Imp. in tanning. (A com.)

Dated 24th October, 1862.

2864. C. C. Burmeister and W. Wain, Copenhagen, Denmark—Imp. in the construction of 'cupolas,' and in apparatus connected therewith, for naval or other war purposes.
 2866. J. Gimson and R. Flude, Leicester—Imp. in looms for weaving narrow fabrics.

Dated 25th October, 1862.

2876. J. A. Nicholson, Gracechurch street—Imp. in lead, crayon, and other pencils.
 2878. A. Clark, Brighton—Imp. in the construction of bows and pendants of watches.
 2882. J. P. Bourquin, Newman-street, Oxford-street—An improved manufacture of mount for photographic and other albums, miniatures, and other pictures.

Dated 27th October, 1862.

2884. J. H. Johnson, 47, Lincoln's Inn-fields—Imp. in rotatory engines.
 2890. F. L. H. W. Bunger, 5, Gloucester-place, Brixton-road—Imp. in self-acting apparatus for discharging the water resulting from the condensation of steam (A com.)
 2892. P. E. Placet, Paris—An improved process of engraving.
 2894. A. Peek, Manchester—Imp. in apparatus for evaporating saccharine and saline solutions.
 2896. J. Howie, Hurlford, Ayr, N.B.—Imp. in machinery or apparatus for regulating the supply of solid or liquid bodies to mills, or other apparatus used in mixing or preparing plastic matters.

Dated 28th October, 1862.

2898. E. Hooper, Southampton—Imp. in roofing tiles.
 2900. E. Tatham and A. Tatham, Ilkeston, Derbyshire—An imp. in warp machines for the manufacture of looped fabrics.
 2906. T. Sutton, St. Brelade's Bay, Jersey—Imp. in preparing albumenized paper for photographic purposes.

Dated 29th October, 1862.

2916. W. E. Evans, 8, Newton-terrace, Bayswater—Imp. in apparatus for playing organs, harmoniums, pianos, and other similar keyed instruments, and also improvements in reed musical instruments.
 2918. W. E. Gedge, 11, Wellington-street, Strand—Imp. in looms for weaving. (A com.)
 2920. J. Head, New Swindon, Wiltshire—Imp. in machinery employed when cultivating land by steam power.
 2922. F. L. Stott, Rochdale—Imp. applicable to mechanism or apparatus for warping yarns or threads.

INVENTION WITH COMPLETE SPECIFICATION FILED.

2935. G. Haseltine, 100, Fleet-street—Imp. in horse-shoe machines. (A com.)—30th October, 1862.

PATENTS SEALED.

[From Gazette, November 7th, 1862.]

November 7th.

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|--|---------------------------------|
| 1387. G. F. Greiner and J. H. C. Sandilands. | 1429. A. B. Freeland. |
| 1403. W. Clark. | 1435. P. M. Lopez. |
| 1404. R. Moore. | 1447. W. Southwood. |
| 1405. R. Moore. | 1457. E. Whittaker and J. Clare |
| 1406. J. T. Cooke. | 1469. G. H. Birkbeck. |
| 1409. J. House. | 1427. J. Wright. |
| 1416. J. Milnes. | 1485. A. L. Thirion. |
| 1417. G. Fuhrmann. | 1518. M. A. F. Mennons. |
| 1421. H. S. Firman. | 1527. J. Kennedy. |
| 1424. H. Cartwright. | 1539. J. Oxley. |
| 1425. W. N. Hutchinson. | 1616. W. Perks, jun. |
| 1426. C. J. Neale. | 1827. B. Fabbriotti. |
| 1427. H. Ashworth. | 2077. T. Meriton. |
| | 2145. Z. Colburn. |

[From Gazette, November 11th, 1862.]

November 11th.

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| 1453. R. A. Brooman. | 1554. P. McGregor. |
| 1456. A. Smith. | 1565. J. Harrison & R. Parkinson. |
| 1459. J. Smith, sen. | 1566. W. Harrison, J. Harrison, J. Oddie, & W. Parkinson. |
| 1468. W. Sissons. | 1595. C. H. Hudson. |
| 1470. J. Stone. | 1631. H. P. Burt. |
| 1474. C. Tress. | 1645. H. Watson & J. Millbourn. |
| 1475. I. Baggs and W. Simpson. | 1655. J. King and J. Partington. |
| 1477. A. Watney. | 1670. G. Gurney. |
| 1482. R. Laming. | 1708. A. V. Newton. |
| 1486. F. B. Anderson. | 1763. W. E. Newton. |
| 1493. B. Sharpe. | 1764. W. E. Newton. |
| 1494. A. V. Newton. | 1911. W. E. Newton. |
| 1495. A. V. Newton. | 2093. C. J. Keene. |
| 1500. J. Hogg, jun. | 2343. C. Monson. |
| 1501. J. Broadley. | 2345. E. S. Ritchie. |
| 1507. J. C. Gore. | 2488. F. Hands and H. Holland. |
| 1517. A. V. Newton. | 2602. W. Clark. |
| 1551. W. Roberts & T. Greenacre. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, November 11th, 1862.]

November 3rd.

2518. J. Chesterman.
 2546. J. Hamer.

November 4th.

2526. W. Mannix.
 2543. G. Hadfield.

November 6th.

2553. E. T. Hughes.

November 7th.

2567. R. Lansdale.

November 8th.

2538. A. Learch.
 2563. T. Blinkhorn.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, November 11th, 1862.]

November 5th.

2582. C. Crum and C. Paul.

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Commissioners of Patents' Journal...	"	Civilisation considered as a Science, George Harris, F.S.A.	"
The National Defences, by G. P. Bidder, jun., M.A.; with an Abstract of the Discussion upon the Paper, and an Appendix, edited by C. Manby, F.R.S., and J. Forrest	Institution of Civil Engineers.	Jabüchern für Volks- und Landwirtschaft, Vol. vii., Vol. viii., parts 1 and 2	"
Plan of Nottingham, by F. Jackson	The Designer.	Catalogue of the Current Coins of all Countries in the International Exhibition, by J. Yates, M.A., F.R.S. (50 copies).....	"
Memoir of Robt. Stephenson, by Alan Stephenson, LL.B., F.R.S.	The Author.	La Tunisie devant l'Europe (120 copies)	General Count de Vandoni.
Twenty-fifth Annual Report of the Art Union of London, 1861.....	Art Union.	Official Classified and Descriptive Catalogue of the Contributions from India to the London Exhibition of 1862	Dr. Forbes Watson.
Dictionary of Universal Information, by S. O. Beeton	The Author.	Memoirs of the Literary and Philosophical Society, Manchester, Vol. i., Third Series	Society.
Transactions of the Royal Scottish Society of Arts. Vol. vi., part I.	Society.	Proceedings of ditto, Vol. ii., 1860-61, 1861-62	"
Dictionnaire de Chimie Industrielle, Vol. ii., part 1, by MM. Barreswil et Aimé Girard.....	The Authors.	Transactions of the Institute of Naval Architects, 1861, Vol. ii.....	Institute. Office.
Catalogue Raisonné; or a List of the Pictures at Blenheim Palace, by George Scharf, F.S.A.	The Author.	Geological Survey of India	J. G. Knight, Commissioner for Victoria.
Statistical Register of South Australia	G. S. Walters.	Catalogue of the Victorian Exhibition of 1861	J. G. Knight, Commissioner for Victoria.
Memoirs of the Geological Survey of India, Vol. iii., part 1	Geological Survey Office.	Statistical Register of Victoria to 1855	
Annual Report of the Geological Survey of India, and Museum of Geology, 1860-61	"	Victorian Government Prize Essays, 1860	
Memoirs of the Geological Survey of India. I. The Fossil Cephalopoda of the Cretaceous Rocks of Southern India (Belemnitidæ nautilidæ), by Henry F. Blandford,	"	Statistical Notes on the Progress of Victoria, 1835 to 1860.....	James Gilbert. Commissioners for Norway.
Catalogue of the Library of the Corporation of London.....	Corporation of London.	Ince and Gilbert's outlines of English History	
Catalogue of the New South Wales Department of the International Exhibition of 1862	Edward Hamilton.	The Vegetable Products of Norway	Sir W. H. Holmes, Commissioner for British Guiana.
Transactions of the Historic Society of Lancashire and Cheshire. Vol. xiii., 1860-61 ..	Society.	Descriptive Catalogue of the Collection sent from the Island of Trinidad to the International Exhibition, 1862	
Experimental Investigation of the laws which govern the propagation of the electric current in long sub-marine telegraph cables, by Latimer Clark	The Author.	Do. do., from British Guiana	"
Minutes of Proceedings of the Institution of Civil Engineers, Vol. xix.	Institution.	Free Cotton: How & where to grow it	A. Cambra, Commissioner for Brazil.
Bericht über die Allgemeine Agricultur- und Industrie-Ausstellung zu Paris im Jahre, 1855.....	Chevalier de Schwarz.	Descriptive Catalogue of the Brazilian Department of the International Exhibition, 1862	A. Andrews, Commissioner for W. Australia.
Rise and Progress of Painting, by E. E. Antrobus, F.S.A.	The Author.	Do. do. of the West Australian Department	
Description of Ancient Marbles, p. xi. Select Papyri, p. ii., plates 1-19.....	Trustees of the British Museum.	Do. do. of the South Australian Department.....	F. S. Dutton, Commissioner for S. Australia.
Notices sur les modèles, Cartes et Dessins. Exposition Universelle de 1862. Empire Français.....	Le Baron Baude.	Do. do. of the Vancouver Department	A. J. Langley, Commissioner for Vancouver's Island.
Monographie de l'île Maurice, translated into French from the Paper read by Mr. Morris before the Society of Arts, 12th March, 1862, by M. Clément J. A. Ulecoq.	James Morris.	Do. do. of the Spanish Department	Commissioners for Spain.
		Do. do. of the Italian Department	Commissioners for Italy.
		Do. do. of the Swedish Department	Commissioners for Sweden.

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Do. do. do., Agricultura, Vol. i. and ii.	"	Transactions of, ditto, Vol. xxiii., part 2, 1861	"
Do. do. do. Artes Chemicas, Vol. i. and ii.	"	Quarterly Journal of the Statistical Society, Vol. xxiv., No. 4; Vol. xxv., Nos. 1—3	"
Relatorio de Commissario Regio junto á Commissao Imperial da Exposicao Univeisal de Paris, Vol. i. and ii.	"	Proceedings of the Royal Society, Vol. xi., Nos. 47, 48; Vol. xii., Nos. 49—51	"
Catalogue of the Belgian Products in the International Exhibition, 1862.	C. Degrelle, Commissioner for Belgium.	Journal of the Chemical Society for 1862	"
Report of the Meeting of the British Association for the Advancement of Science, held at Manchester, 1861	Dr. J. Phillips, M.A., F.R.S.	Canadian Naturalist and Geologist, Vol. vii., Nos. 1—4.	Montreal Natural History Society.
Report of Yorkshire Union of Mechanics' Institutions, at Twenty-fifth Annual Meeting	Institution.	American Journal of Science and Art, Nos. 96—101	B. Siliman.
Forty-second Annual Report of the Trustees of the New York State Library, 1860	New York State Library.	Journal of the Royal Agricultural Society, Vol. xxii., No. 2; Vol. xxiii., No. 1	Society.
Forty third, ditto, ditto, 1861	"	Papers read at the Royal Institute of British Architects, 1861—62.	Institute.
Guide to the Geology of New York, and to the State Geological Cabinet	"	Journal of the Royal Asiatic Society, Vol. xix., No. 4; Vol. xx., No. 1.	Society.
Twelfth Annual Report of the State of New York on the Condition of the State-Cabinet of Natural History, 1859	"	Proceedings of the Institution of Mechanical Engineers for 1862...	Institute.
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Fourteenth, ditto, ditto, 1861	"	Memoirs of the Royal Astronomical Society, Vol. xxx., 1860—61.	Society.
Seventy-third Annual Report of the Regents of the University of the State of New York, 1860	"	Proceedings of the Society of Antiquaries, Session 1861—62.	"
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Address delivered at the Anniversary Meeting of the Geological Society of London, by Professor T. Huxley, Feb., 1862	Society.	The Thirty-fourth Annual Report of the Royal Scottish Academy of Painting, 1861	Council of the Academy.
Quarterly Journal of the Geological Society, Vol. xviii., Nos. 1—4. ...	"	The Essentials of a Healthy Dwelling, and the Extension of its Benefits to the Labouring Population, by Henry Roberts, F.S.A.	The Author.
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Journal of the Royal United Service Institution, Vol. v., No. 20; Vol. vi., Nos. 21—23	Institution.	The Dictionary of Calico Printing and Dyeing, by Charles O'Neill, F.C.S.	"
		The Iliad of Homer, faithfully translated into unrhymed English metre, by Prof. F. W. Newman (100 copies)	"

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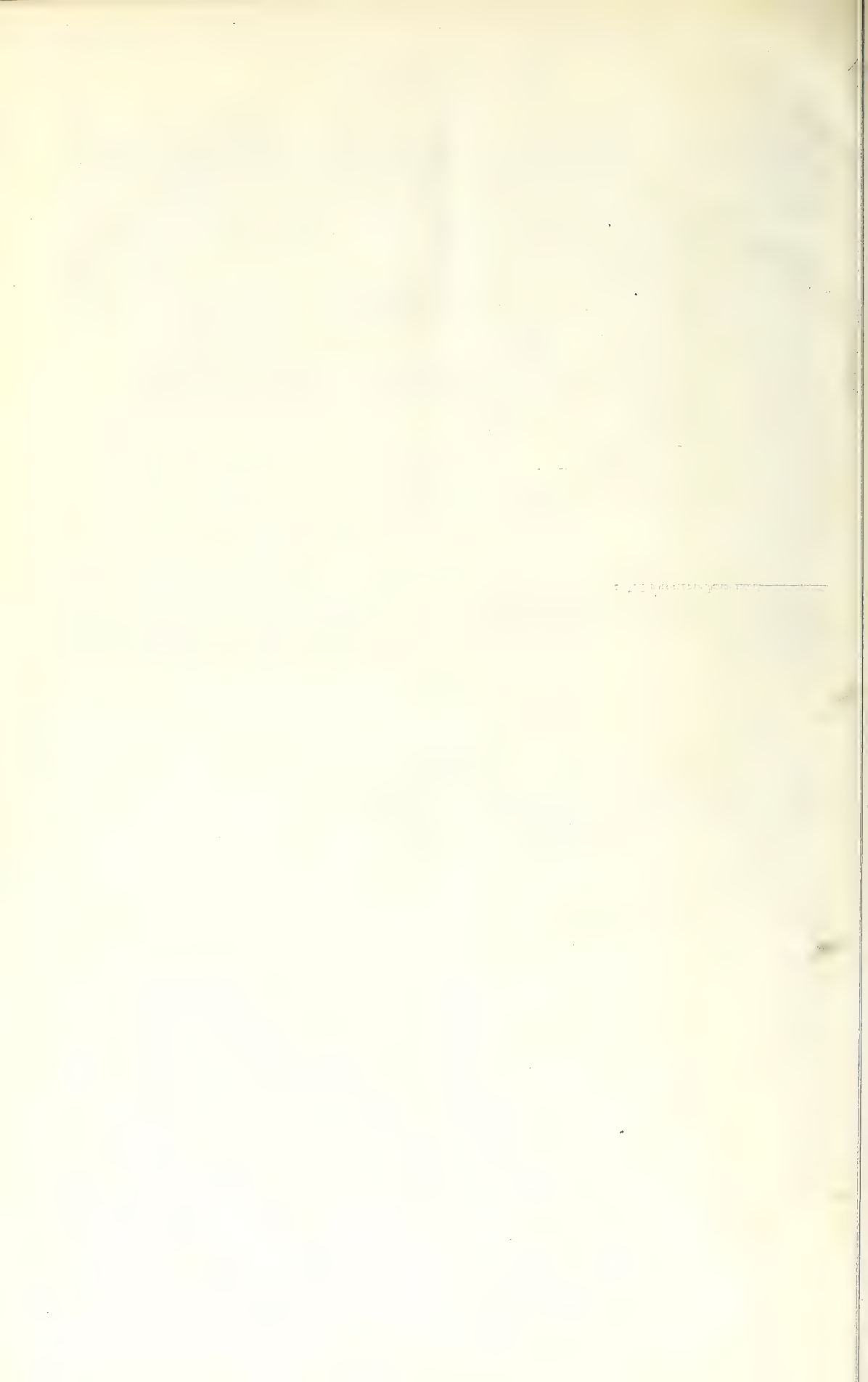
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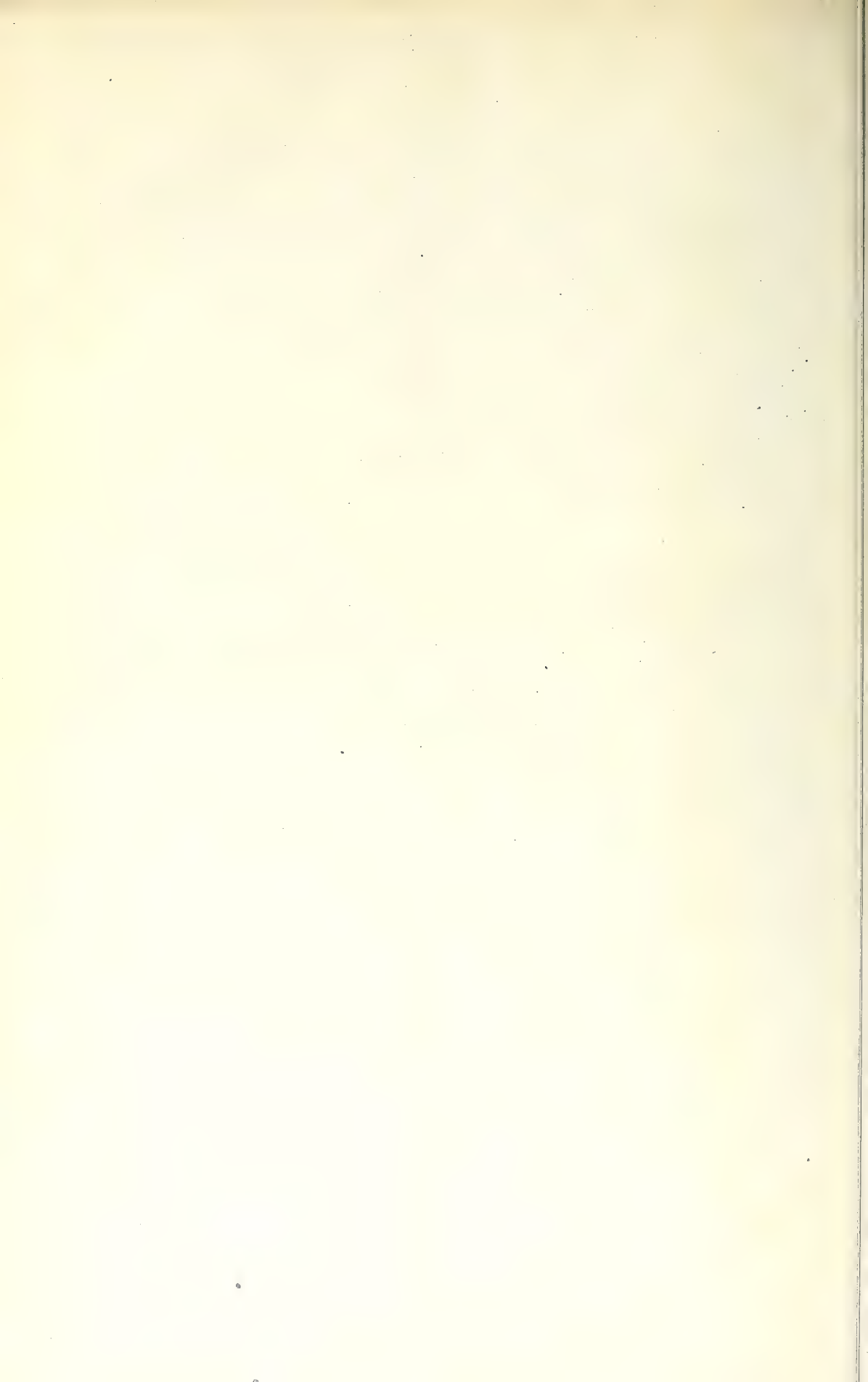
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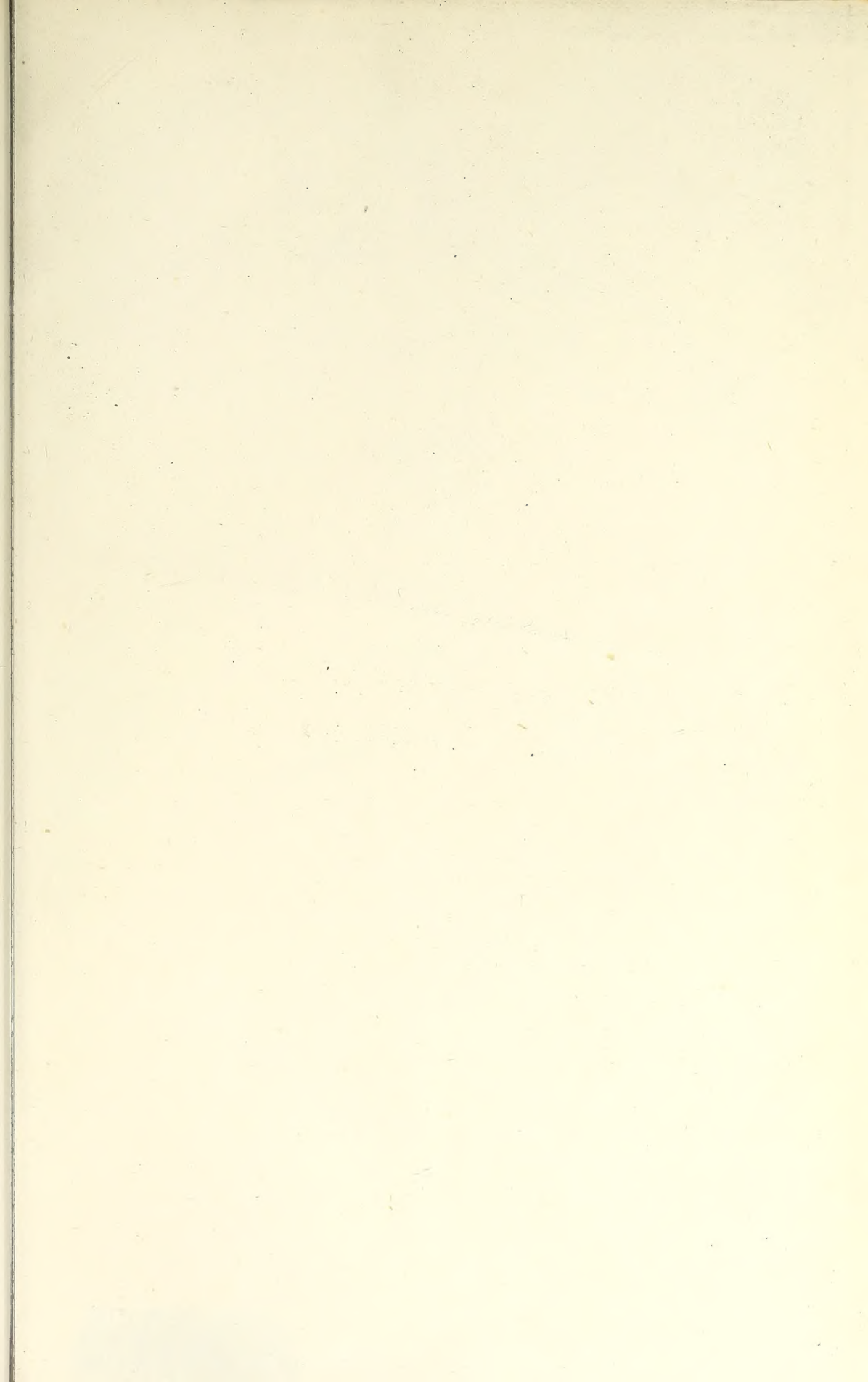
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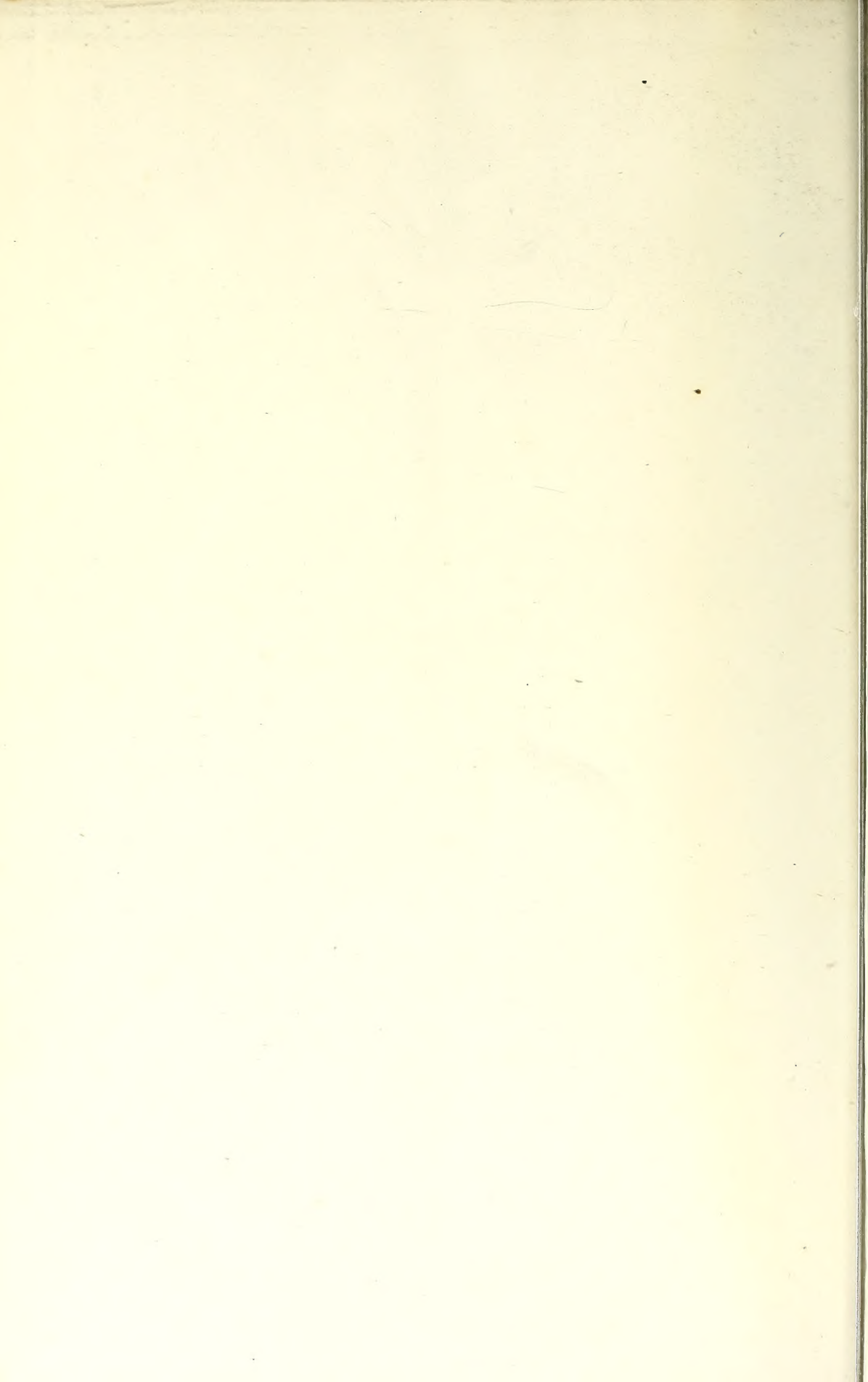
In page 134, col. 1, line 30, for "corn" read "cotton," and line 60, for "Sakover" read "Oakover."
 In page 273, col. 1, line 48, for "years" read "centuries."

In page 291, col. 1, line 56, after "paid" insert "to foreigners."
 In page 397, col. 1, line 19 from bottom, for "Thomas" read "John."









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